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THE ASCLEPIAD.

A Book of Original Research and Observation

IN THE

SCIENCE, ART, AND LITERATURE OF MEDICINE,
PREVENTIVE AND CURATIVE.

1886.

BY

Benjamin Ward Richardson, M.D., F.R.S.

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In Memoriam.

TO MY LATE

BELOVED AND LEARNED BRETHREN IN THE SCIENCE
AND ART OF HEALING THE SICK,

WHOSE DEVOTION KNEW NO WEARINESS,

SKILL NO END,

INDUSTRY NO REST,

FRIENDSHIP NO BREAK,

KELBURNE KING, M.D., F.R.C.S.,

OF HULL,

AND

JOSEPH SAMPSON GAMGEE, M.R.C.S., F.R.S.E.,

OF BIRMINGHAM,

THIS THE THIRD VOLUME OF *THE ASCLEPIAD*

IS AFFECTIONATELY

Inscribed.

PREFACE

TO THE THIRD VOLUME OF THE "ASCLEPIAD."

NO part of my work during the last twelve months has been so truly agreeable as that by which the third volume of the ASCLEPIAD has been brought to its completion. To this has been added the extreme satisfaction of seeing how freely and generously the various subjects introduced into the volume have been discussed by contemporary authors of all classes. My best thanks to all.

BENJAMIN WARD RICHARDSON.

25, MANCHESTER SQUARE, LONDON, W.

October 31st, 1886.

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CHILBLAIN CIRCULATION.—A CLINICAL STUDY.

IN the essay on local syncope in THE ASCLEPIAD for January 1885, a condition of disease is described, in which a sudden failure of the circulation is exhibited in the fingers of one or other hand. In the present essay I am about to refer to another condition of failure, to which I have given the name of *chilblain circulation*, because those affected are always liable to chilblains during periods when the weather is very cold, and because the phenomenon of chilblain seems to bear some relation to the general feebleness in the course of the blood, to which I would now particularly call attention. In order to indicate clearly the conditions to which the term chilblain circulation is applicable, let my clinical note-book supply three typical but not extreme illustrations.

I.

The patient is a man forty-five years of age; he has blue eyes, light brown hair, and fair complexion. He is of spare build and five feet seven inches in height. His father died at seventy from paralysis, his mother is living and in fair health, but all his brothers and

sisters—three brothers and two sisters—are what is called “feeble and nervous.” He is engaged in a light occupation, which keeps him indoors, but not at a sedentary pursuit. He is temperate, and does not smoke. He never in his life has been subjected to an attack of acute disease of sufficient severity to enforce him to keep his bed; on the other hand, he has never been “well and strong as many are.” His appetite is fair, and is “better than his digestion.” He sleeps well, but is easily depressed, both in body and mind, if from any cause his sleep is disturbed. His power for mental work is moderately good, and when he has been taking out-door exercise for a few weeks his physical capacity for muscular work improves, although, at the best, it is never up to the mark. He is, as a rule, dyspeptic, in spite of the utmost care in diet and regimen. After a meal he is often subject to fluttering or palpitation of the heart, with muscular tremulousness and starts in the muscles, especially in the biceps and deltoid. He is always exhausted for a short time after a meal. His tongue is often slightly furred, and his bowels are habitually constipated. His renal secretion is natural as to quantity, and contains nothing steadily abnormal, but is generally pale, with occasional copious lithatic deposit. He has no cough, and the vital capacity of the chest is good,—290 cubic inches. In this history, taken alone, we have before us an ordinary dyspeptic, such as is met with many times every month in morning practice. But the symptoms named are not what he comes specially to be advised upon. He could put up with them. What he suffers from is “the circulation in his extremities.” At all seasons, and under all circumstances, his hands and feet are cold, his nose and ears usually sharing, acutely, in the same chilliness.

When the weather is favourably warm, or agreeably temperate, he is still cold in his extremities. When the weather is very hot, he is cold and moist in the extremities. When the weather is very cold, his hands, feet, and tips of his ears are, at intervals, so cold, they feel as if they were actually dead, and are bluish-white in colour; then he soon begins to suffer from chilblain or reaction from cold like the tingling of "hot ache," followed speedily by a return of the extreme coldness.

These are the subjective signs; the objective are equally characteristic. To the observer the hands and feet are cold, and on one occasion, when the temperature of these parts was compared with the temperature of the mouth, a difference of 33° F. was detected. The temperature within the mouth was 98.4° F.; the temperature of the hands, with the thermometer well embedded in the folds between the thumb and palm, and with the hands covered, was 65.4° F., or within two degrees of the temperature of the surrounding air. The mobility of the chilled parts remained unchanged, and the muscular power or grasp was undiminished to appreciable observation; but the sensibility was lessened, the touch impaired, and the facility for refined acts, such as threading a needle, was imperfect.

In the objective readings of the circulation, there was a remarkably characteristic deviation from the natural. The sounds of the heart were normal; the number of heart-strokes sixty-eight per minute; the beats regular, and the impulse good,—indications of a healthy, well-balanced, and by no means feeble heart. In the absence, indeed, of the coldness of the extremities and the other signs of deficient power, the stethoscopic indications from the heart would have conveyed

that the patient had a strong and efficient circulation from the centre. The lungs were sound, and the breathing regular and unembarrassed.

But when the arterial circulation through the hands was inquired into, the circumstances were found to be extremely different. The pulse at each wrist was so feeble it was a matter of difficulty to get a good sphygmographic tracing. A pressure of four ounces was sufficient to put the radial pulse out entirely, and at two and a-half ounces the readings could just be taken, and no more. The impulse line was then, as will be seen by the diagram, one degree and a-half; the space between each impulse nearly three times the length of

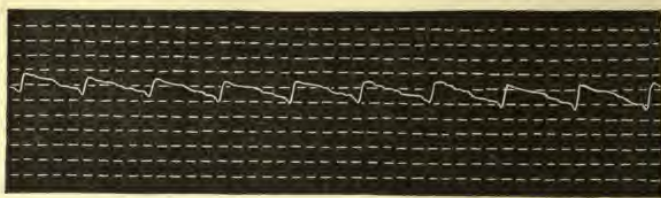


FIG. 1.

the impulse line itself; the first fall of the pressure indistinct; the second rise or recoil, almost imperceptible, and the succeeding curves equally feeble.

There could be no surprise that, with the local circulation so enfeebled, the extremities should be cold, and the cutaneous circulation defective in the extremities.

II.

I turn from the above illustration to another, in which a girl, seventeen years of age, is the subject of observation. In this instance the temperament is nervous-lymphatic. The mother is strongly rheu-

matic, the father often ailing, and disposed to obesity. The patient is well nourished. She has a slight chronic lateral curvature in the dorsal region, but has been singularly free from acute disease. She has no pain, has a good appetite, and a natural aptitude for sleep, sleeping all the night. In physical capacity she is deficient, and in mental erratic and inconsequent. She learns with difficulty owing to lassitude, and when she makes any long endeavour is clouded with strange ideas, such as that the doors of the room in which she works are moving or opening constantly, or that they will be forced. Her tongue is quite clean; the action of the bowels regular each day; and, the renal secretion natural. The catamenia have occurred irregularly and scantily. The chest sounds are clear throughout, and she is free from cough. The heart sounds are quite clear; the beats of the heart strong, regular, and natural; sufficient in every way for the necessities of the organism.

The marked aberration from health in this patient, setting aside the chronic spinal curvature, which is not a cause of complaint, is the extreme coldness of the hands, the feet, and the nose, and the frequent occurrence of chilblains in the hands and feet. Comparing the temperature of the mouth with that of the hands on the day when she first came to my consulting room, I found the mouth temperature to be 98° Fahr., the temperature of the hands and feet precisely that of the air of the room, namely 62° F., a difference of 36°. The pulse was so feeble it was difficult to get a tracing, but after many attempts the following reading was obtained, from the right radial, under a pressure of two ounces. The tracing shows an impulse stroke of only one degree; a distance of one impulse to another of over five

degrees, and between each impulse a series of descending and ascending curves which are scarcely discernible.

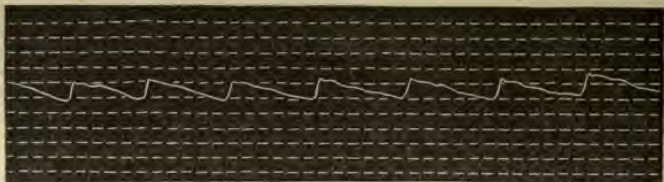


FIG. 2.

In short, the local circulation is deficient by at least three-fifths its natural value. The hands grasp fairly, but the common sensibility is reduced, touch is very imperfect, and delicate acts of manipulation are all but impossible. The nose, in this case, also, is as cold as the hands and feet, and often is bedewed with moisture as if from condensation of the water of the breath upon its outer surface. The hands and feet are bluish red in colour at one moment and dull dark red at another, but equally cold under both states.

III.

A lady, forty-seven years of age, is now the subject of record. She is of fair complexion with eyes grey; hair light brown, at this time fading into grey; temperament nervous. Her father lived to seventy-four years, and died from general decay, he and many of his family having been chronic sufferers from coldness of the extremities and chilblains. Her mother died at the age of fifty-nine from ramollissement of the brain. She herself has led an active, anxious, but very temperate life. She has suffered occasionally from rheumatism, but has enjoyed fair health altogether, with one exception, viz., that her extremities have always been cold, and that so soon as winter has commenced she has suffered, all her

life, as far back as she can remember, from chilblains on the hands, feet, and tips of the ears.

At the time of her visit to me she has a new series of subjective symptoms, which are causing her very natural anxiety. She reports that when she is walking or taking any trifling exercise, she feels unable to stand unless she can put out her hand for some support. Her face at such times becomes of dark-red colour and cold. Her lower limbs feel as if they were giving way beneath her, and her feet and hands become extremely cold. Her heart, during this period, palpitates vehemently; but consciousness is never lost, and the sensation in no way resembles what is commonly called faintness. The seizure often lasts for a minute or more, and then passes away, leaving always intense coldness and chilblain irritation even in mild or temperate weather. She is free of acute pain, but has an indifferent appetite; of late does not sleep soundly; is less capable of mental effort than formerly; and, is easily tired from any physical exercise. The alvine and renal functions are regular and natural; the catamenia still recur at long intervals, and sometimes rather copiously.

Objectively, the patient presents the following symptoms. The body is well nourished; but the countenance anxious and wearied. The surfaces of the hands and face are rather darker than natural. The mouth temperature is 98.4° Fahr., the temperature of the hands, which to me feel extremely cold, is 68° Fahr. in an atmosphere of 65° Fahr. The muscular grasp of the hands is firm and strong; the common sensibility dull. the tactile sense indifferent, and, the movements of the fingers for fine work, as it is best expressed, clumsy. The breathing is eighteen per minute, the pulse sixty-four.

The sphygmographic reading from the right radial

artery is better developed than in the cases previously cited, but it is very characteristic. The impulse stroke



FIG. 3.

measures two degrees only; the first descent is barely half a degree; the arterial impulse is but half a degree, and almost in a horizontal line; the second descent is indefinite; the aortic chuck is feebly marked; and the final descent is prolonged to nearly double its normal length. Pressure three ounces on right radial.

With this feebleness of the circulation in the extreme parts the work of the heart contrasts in the most striking manner. The systole of the heart is powerful, and accompanied with a slight murmur followed by an accented second sound. The region of cardiac dulness is considerable, and all the physical evidences of a large and powerful heart are present. The chest sounds are everywhere clear.

In the above I have drawn from the life three typical forms of chilblain circulation. In all the condition has been congenital, and in every other instance I have met the same has been the fact. The sufferers constitute a distinct class of our community, and throughout their lives exhibit a series of phenomena which, varying a little in detail, are alike in all essential points.

In early life these sufferers are excessively sensitive to variations of temperature. They bear cold most indifferently, and they are easily overcome by fatigue,

either of body or mind. They compete badly with their fellows in all manner of exercises; they are often imposed upon by those around them; and, they not uncommonly are punished by injudicious masters because they cannot make the progress which is expected of them. They are usually timorous, and are rendered irritable and, indeed, miserable by the consciousness of their inability to compete fairly with their compeers. Still, they may be affectionate to a fault, and confiding to simplicity. Hence to them is specially applied the old and wise saying "a cold hand and a warm heart." By steady plodding industry they sometimes earn a good, or, it may be, a first-class position, but, to them, always with infinite labour. The majority of them, I fear, are not successful in the first degree. They cannot possibly keep up in the furious race of life with those stronger built, and so they are held in the background, making little way. Many of them sink under acute disease, to meet which they are endowed with feeble vitality, and certain of them are apt to pass into hypochondriasis from which they never really recover. The poet Cowper may be taken as a very good illustration of one of this class, who, under very favouring conditions, left his mark and attained gentle fame.

Towards the natural middle period of life, fifty to sixty years of age, these representatives of weak peripheral circulation begin to be old and enfeebled. They suffer intensely from the winter's cold, they shrink from both mental and physical labour, and, as in the third case which has been narrated, they are often subject to giddiness or vertigo when the action of the heart is more than usually pronounced, as it so often is in them. Some of them sink into paralysis after repeated indications of cerebral failure, but the larger

number who pass middle age become prematurely old, and succumb gradually from premature senile decay.

I have passed in the two last paragraphs from the young who suffer from chilblain circulation to the middle aged, leaving out, for the moment, those of the intermediate periods of life, of whom a few words must now be said. These sufferers in the intermediate periods are badly fitted to meet the accidents and diseases incident to the middle passage of life. If there is in them any distinctive diathetic condition they are open to attack from the same, under influences which in persons of stronger build are comparatively trifling. Colds in them pass, easily, into phthisis pulmonalis, when the proclivity to that disease is present, and the same rule obtains, I believe, towards all proclivities, epilepsy, cancer, eczema and other forms of chronic skin disease, and, in short, every variety of impaired nutrition, local or general, and imperfect balance of regulating function dependent on nervous control. In districts of the poor, where poverty and exposure go hand in hand, the common affection of ulceration on the lower limbs is like a natural sequence amongst those who suffer from chilblain circulation. In my earliest days in medical practice, when, as an articled pupil or assistant, I was in attendance on the poor day by day, this fact came too often before me, and too obviously to admit of being ignored. The extremities of those who suffered from chronic ulceration were always cold, and the almost universal testimony of the affected was to the pre-existence of chilblain, from their early days.

In summary. Chilblain manifestation is evidence of a shortened, and in many cases of an abortive peripheral circulation in the extremities of the body.

Its most striking characteristic is a feeble or languid circulation in the extremities, with a natural, or with an over-active central circulation, that is to say, a natural or powerful heart; a heart, natural at the beginning of life, but becoming more powerful during life from the resistance it has to overcome in its shortened circuit. Whenever, therefore, the practitioner puts his finger on a feeble pulse accompanied with coldness of surface, and finds with those two symptoms a powerful heart, in which there is no impediment to the course of the blood, he will, as a rule, have in hand a patient in whom the shortened or abortive circulation is declared.

There are also, as a rule, a good many outward objective signs of the same condition. The eyeball is small; the lobe of the ear small or absent; the hair scanty and delicate; the teeth small, if not irregular or defective; the hands small as well as cold, and wanting in strong grip; the feet small and the tread dainty or infirm; the manner nervous, or irritable; the stature either of medium height and broad, or very tall, and what is vulgarly called lanky.

PATHOLOGICAL DEFINITIONS OF CHILBLAIN CIRCULATION.

The pathological definition of the chilblain constitution is that of an organism in which from some cause of a congenital nature the circulation is not fully developed to the extreme confines of those parts of the body which project from the trunk,—the extremities. The organs of organic life may be, and often are, well developed; the brain may be well formed and nourished, although in some cases it suffers with the other lower vitalised structures. In the parts showing the weakened vitality there is a reduced chemical action, a feebler *eremacausis*, and resistance to the course of the blood

from the centre. The chilblain so easily induced is a result; it is like a modified frost bite; while the pallor and dull-red colour of the surface of the skin is like the varying change which the cutaneous surface of all persons undergoes when the cold is extreme; the whiteness passing to dull-red, the chilliness to the reaction called hot ache. The increased cardiac action is a natural result, due to the greater work which the heart has to perform in a shortened circuit of blood.

In most cases the peculiarity of construction leading to chilblain circulation is congenital, but the nature of the condition, from its primary source, is not so clear. In many examples it is traceable to premature birth; in some instances it occurs in those who are of twin birth; but in others the origin is not directly obvious, except that the cause, whatever it may be, "runs in families," as if some specific and original taint were at the bottom of it, like specific disease, or struma.

HYGIENIC AND MEDICAL TREATMENT.

For those who are born with chilblain circulation much may be done in early life to meet and remove the difficulty,—a matter of hygienic practice hitherto much overlooked. When the healthy man, suffering from extreme winter's cold, exercises his arms by throwing them briskly across his chest,—“beating the booby,”—or stamps his feet briskly on the ground, he indicates unwittingly what he or she should do who is so unfortunate as to be born with a reduced vitality of the extremities. For people so born the freest exercise of the limbs should be encouraged from the first days of life after walking has been fully established. I wish also specially to impress the direction that the exercise should be exercise of the limbs, pre-eminently,

as well as exercise of the trunk. I do not mean to say by this direction that general out-door exercise, involving the whole muscular system, is to be avoided; not at all. The fullest exercise should be prudently encouraged. What is most desirable, however, to indicate is that with general exercise of the body special exercise of the limbs is absolutely necessary, exercise that may be carried on within as well as outside the house. Walking, not running, is good; dumb-bell exercise, and pedalling with the feet is good; playing on the piano-forte is good; working the treadle of a lathe is good. In short, every exercise which calls the extremities into special play without fatiguing them too severely, and without imposing too much labour on the heart is good. The deficiency of circulation, be it remembered, is of local character; the influences to be used for increasing the nutrition and development of the parts implicated must, therefore, be local as well as general.

At the same time, when the temperature is low, the extremities should be kept warmly covered. In the early period of life, and in all after-periods, every act that leads to nervous feebleness and exhaustion should be specially avoided. Excessive bodily and mental strain is most injurious. Smoking is very injurious; the regular use of alcohol as a beverage is unquestionably deleterious, inasmuch as it quickens the action of a heart already overtaxed, and tends to hasten degenerative exhaustion. Whatever prevents a full measure of sleep is most prejudicial. Whatever leads to irregularity of meals and to frequently recurring sense of faintness from long fasting is equally injurious.

In chilblain circulation late in life, when, with persistent coldness, the heart is also becoming enfeebled, the rules above quoted should, with a few variations, be

carried out, but with increasing care. The variations I usually suggest relate to exercise, warmth, and diet. Without forbidding active exercise, it is important to be most watchful that the exercise should not be allowed to extend to extreme fatigue. The body should be well and equally clothed, and the bedroom should be kept at all times at a temperature not lower than 60° Fahr. The bed clothing should also be sufficient, as light as possible in regard to mere weight of clothes, but capable of retaining the animal warmth. In very bad cases of the kind now named, where the heart as well as the peripheral circulation is failing, I sometimes prescribe alcohol—always as alcohol—as a medicine, and I think with benefit. The rule I go by in such cases is, that when sleep cannot be obtained because of the coldness of the extremities, and when external warmth is of no avail, then a measured quantity of alcohol, by its relaxing power over the peripheral circulation, is of temporary service. I prescribe it under such circumstances, at bed time, in half-ounce doses, with a little oatmeal or whole meal gruel, or with bread and milk. The great danger of this treatment is that the remedy, unless it be closely watched, soon becomes too seductive to be trusted. Carried a very little beyond the required dose, it, of itself, intensifies the coldness, and does more harm than good.

Medicinally, in cases where the heart is failing, digitalis, prudently administered, is often extremely useful. I commonly prescribe it in combination with ammonio-citrate of iron, or with the syrup of the bromide of iron and quinine. After all, attention to the general rules leading to healthy life is the best treatment the physician is able to enjoin and enforce.

TEMPERANCE AND YOUNG PHYSIC.*

“O I say that I come to tie you to this war? No! But this I do say, that if with me you would prosecute this war, prosecute vigorously, or don't do it at all. I think it my duty to deal plainly, and therefore I say, Prosecute it vigorously.”

This admonition, addressed by one of the greatest rulers and soldiers who ever sat at the head of affairs in England to the finest volunteers, who ever fought for English liberty, is a good text for an address to those volunteers in the army of young physic who are now going forth to fight for the liberty of the abject, for the entire liberty of the world from the most oppressive and aggressive foe with which the world is afflicted.

The opportunity for enforcing the lessons derivable from this text is most fortunate, for me too fortunate, since I doubt if I can take all that advantage of it which it presents so forcibly. If I had the power of the author of the text, I might indeed be sure of victorious application, but such as he are men of a century, and govern their time.

* Address delivered on the occasion of presenting the prize of One Hundred Guineas from the British Medical Temperance Association, to Mr. H. A. W. Coryn, student of Charing Cross Hospital, January 22nd, 1886.

Let the text, nevertheless, stand on its own earnestness and impulse, as still a living precept.

One of the rising army of healers takes from my hand a prize to-day. The prize is not intended as a mere pecuniary reward. It is richest as a distinction and recognition of merit. We who have been most concerned in awarding this prize join with many voices, thousands of voices I am sure, in congratulating the victor. We trust, as we believe, that this success will be the first of many that are to follow; and with that earnest wish I will say no more of his victory.

I apply my text from henceforth to all who have competed for the prize, tendering to many of them, and to three especially, true admiration for their all but successful efforts. I apply it further still, namely to every student of medicine who is in sympathy with the great cause of universal temperance, nay to every student whose mind, not yet made up, is hesitating whether it is not his duty to come over to our side.

But to each one we say:—If you wish to join us in this war, if you wish to prosecute this war, prosecute it vigorously.

REASONS FOR THE WAR.

Why, ask you, is so much urged upon you? Why should you leave the ranks of the majority to fight a battle that must bring you into conflict with many, and which may imperil your future fortune and fame? It is my duty to give answer to this inquiry.

First, then, I conjure you to prosecute the war for your own sakes. A selfish ideal! Not at all when self-sake is properly comprehended. If this self-sake, which I here commend, were for your own self-gratification, I would not for a moment enforce it. But in self-sake as

it is here commended the interests of thousands, nay tens of thousands of others, are included with your own. You are not likely to prosecute the temperance cause without being yourselves representatives of that which you represent, which means self-protection, not to yourselves only, but to all whom you would help and directly advise. If you practise temperance by entirely abstaining from alcoholic drinks, you, as preservers of health, will be the finest representatives of that which you preserve. You will be precise in your work, decisive in your work, ready for your work, and enduring at your work to the fullest extent of your natural powers. If you have to perform the most delicate of operations that surgery prescribes, you will retain a delicacy and refinement of touch which is the very essence of perfect skill. If you are summoned to some hazard of life, in which the triumph of life or death shall depend on your instant action, you will maintain that power of decision which is the first essential quality for the emergency. If you are placed in a position, so common in a medical career, when a number of varying circumstances run together to embarrass and perplex you; when sympathy clashes with judgment, and your head and heart are readily set at variance; when multitudes of counsellors, some timid, some rash, declare their opinions; and, when tender, anxious friends hang on your hands for help and on your lips for hope—you will retain the presence of mind without which you may be worse than useless. If you are taxed with severe and long labour, night watching, day watching, worry, you will possess an endurance which will carry you on, to the wonder of those who, less careful of their own lives and powers, look on to envy or admire. Precision, decision, presence of mind,

endurance, these four cardinal virtues are yours, as far as you are constructed to own them, to their fullest value, if vigorously you prosecute this war.

There is richness of promise here, indeed, for every son of physic, enough to lead every thoughtful son to make up instantly his mind, if for nothing more. There is much more. These qualities will be crowned with happier, less clouded, longer life, if they be based on temperance. Let not one of you be for one moment deceived on this point. Let no plea for occasional indulgence, let no argument in sustainment of the safety of moderation influence your minds on this all-important matter. Those of you who may live as long as I have lived will in your musing hours, sitting by your firesides when the day's work is done, or riding through busy streets in busy cities, or over field, road, moor, or mountain in country-sides, recall your early days and early comrades and friends of student times. You will reckon up the living and the dead, and believe me, the reckoning, even in your happier day, will be both sad and solemn. You will be sure to recall some of the brightest and ablest of your early compeers who are dead! dead from no cause but one. You will summon up a few who have fallen from disease contracted in the course of duty: some who have fallen from disease inherited and to them inevitable; some who have fallen from accident or battle; but these all put together will, I fear, fail to represent, numerically, those who have fallen from alcoholic drinks. You will have it on your record, too, that education, talent, genius, had no restraining power over these fatalities. The same order of facts will be in the book of life and death which you may read from other records than those

of your early friends. Your practice will also bring to you precisely similar data. Aside, nevertheless, will be another picture. In the temperate of your time and race, of all ranks and callings, you will discover the promise of length of days, riches, honour, fulfilled to the very letter of prophetic word.

FOR A LIFE WORTH LIVING.

“Ah, but,” perhaps some of you may say—and I have heard the saying from much older lips than yours—“why should we look for wealth of life and length of it? Is it so fine a prospect to grow old and weary, with life a burthen, and death the only transport to be yearned for?” No, I reply, if that were natural necessity. But I will tell you what you will hear, and see, and learn, as you go on in your careers. You will hear men in their prime talk much nonsense about short lives and merry. When, however, you have to come to them and are forced to tell them that the short life and once merry is near its early close, then you will hear the jeremiad of lamentation and moaning and woe, the merry life the bitterest of all recollections, the coming closure of it the deepest of all regrets. You will see men who have just arrived at that age of judgment when their knowledge, their experience, their powers are most ripe, pass away when those powers for directing good and useful service were most promising and most required. You will learn from the truly temperate that age, and even advanced age, may be attained with cheerfulness, usefulness; and, that the euthanasia which nature intends for every one of her children, making death as unknowable as birth, is the sure and certain reward of a natural life.

Let me repeat you a true saying, an historic truth

often told, and by cynics of the Carlyle class made much of, as if it were something creditable because it is true. The true saying to which I refer is that the world lacks wisdom, or, put in another form, that there is plenty of every sense except common sense. Admitted. But why? Well, I think the reason is clear enough. There has been as yet no full maturity amongst the children of men. Men grow up to manhood acquiring knowledge; they collect by observation what they call experience; they reach the period when their mental tablets are filled with all they can hold; and, when they have attained the fulness of wisdom and are just in form to make the world wise, they either die or become so feeble that living they are, practically, dead. In a large majority of instances, this premature death, or this premature failure, is the result of indulgence in alcoholic drinks. In some eras, as the Elizabethan, and in the early part of the present century, the ablest men fell from this cause as by a natural event. A man at sixty had run his career. He might have had a fourth term of life in which wisely to labour, and all forfeited. The forfeit was breathed in the refrain, once so popular over the winecup:—

“ So ’tis with us, my jovial souls,
Let pleasure reign while here we stay;
Let’s fill with joy our flowing bowls,
When Jove commands we must obey.”

And Jove did command, and no mistake whatever.

FOR PROFESSIONAL CONSISTENCY.

For your own sakes then, in the best sense of selfishness, prosecute this war. Do it for another sake, for the sake of the noble and mighty profession you were made to adorn as well as practise.

In alcohol there is an agent which cuts down by disease, in England and Wales alone, one thousand persons a week. What if any other cause of mortality did the same? What if one thousand persons per week died, in the same area, from the bite of the rabid dog or the snake; by the swallowing of arsenic, opium, or prussic acid? What if some thousand persons a week were known to be killed by the secret devices of the slow poisoner, who, under the guise of friendship, went about and instilled into his victims some subtle drop which led to the shortening of their life and to the production of lingering organic fatal disease? What, indeed, then would be the cry and the action? Why, all through the ranks of the great profession of medicine there would be a tumult of labour and toil, such as never before was seen, to remove the calamity. Men would be ambitious to be first to discover by experiment, by experience, the cause of so fearful an evil, and to remove it instantly; while he who won the victory over the calamity would be extolled as illustrious, and, crowned with honour, become a household word from amongst the children of Esculapius. Yet here one single cause making this deadly havoc, a cause well-known and easily removable, in spite of its evils and in the face of its easy removal, is permitted to remain in sight with a majority of the army of medicine looking on in apathy, pitying us "poor foolish fanatics" who are exercising our limited powers to uproot it, and some, with the rest of the world, so sharing the calamity as to become co-partners in the destruction which follows from the participation.

This last practice is the saddest, the worst of all, and I do sincerely pray you of young physic, across whose vision the light has flitted, never to let it stultify

your professional consistency and your professional power for good. Of all men be you the last to disseminate, either by example or any other method, the seeds of mortal disease. Brace yourselves up to the unalterable faith that of all businesses, callings, professions, it is not yours to teach the world the art of suicide by lethal luxury.

I have observed such reckless thought on this subject you must not think me pressing too hard if I pray you once again to be mindful of your duty in this respect. I have seen one who, in attendance on the delirious inebriate, as chief controlling guardian, was so seduced as to drink from the same cup the same fatal inebriate draught. I have seen the guardian take the place of the guarded ; and through my mind, with piercing force, has come the proverb :—

“Vidi ego, naufragium qui riserat, æquore mergi :
Et, Nunquam, dixi, justior, unda fuit.”

I have seen him who at a shipwreck jeered
Sink down to die beneath the treacherous wave ;
And I exclaimed, “Never since vessel steered
Hath the deep sea more justly formed a grave.”

Let no such shipwreck be your unhappy lot.

I call upon you then to prosecute this war for temperance as becomes your own interests, and as becomes the power and the dignity of your profession. I call upon you further to prosecute it vigorously or not to do it at all. We stand now at a point where there must be no playing fast and loose with the enemy that is before us. The man who, impressed with the importance of this war, hesitates by precept or example to fight it out bravely and consistently is much better away from us than with us. The public, ever observant,

spot, if I may so say,—spot insincerity sooner and more keenly than any other failing. The good repudiate it and all who trade on it, indignantly ; the bad accept it and make market out of it. You can no more stop at half-measures morally than you can physically. The drinker who takes up the noggin of ale and puts it to his mouth thinks little of gradations ; and he who takes up the principle of admitting the noggin, as a necessity or compromise, thinks just as little. Between the taking up and the setting down there is no safety, no principle. The safety, the principle, rest on never taking up at all. The drink sellers put at the bottom of their tankards a floor of glass instead of metal. The drinker is thus able to witness the removal of the last obscuring drop, to be certain he has taken into himself all the tankard can hold, to feel that he has exchanged places with the pewter, and to discover how empty it is and how full he. That glass floor at the bottom of the tankard reveals volumes. It carries with it the whole story of craving for, and crime from, alcoholic drink. The drinker has to see that he has finished. He cannot feel the fact, because by mere feeling his satisfaction cannot be calculated. His folly is made transparent in the tankard, but it is as transparent in those who play fast and loose with the principle of temperance ; who say wine is a mocker, and who mock at temperance by measured compromises with wine.

Be consistent, then, in all your relations to this subject. If in a physical war you attacked a fort, you would not consider you had silenced it because you had knocked over its larger ordnance, while its minor guns poured out their still fatal, though less fatal volleys. What Ironside would have considered that plan as

a part of his leader's charge to prosecute the war vigorously? No! you would fight on until not a single rifle was pointed against you. You would fight until the foe was totally beaten. So fight in this war.

A word as to the mode of warfare. I am greatly pleased, as one of the judges of our prize, to see the mode in which many of the essayists, the majority indeed, have conducted their work. They have proceeded, as they were bound to proceed, on the lines of scientific research. They have striven to prove from the best authorities, and some by original thesis, that alcohol forms no part in the natural life of the natural human being. This, for the doctor, is the one and right way. In order to gain success in argument on the alcohol question, he must carry conviction by following rigidly, nay exclusively, the plan of indicating the rôle of alcohol from physiological, hygienical, and pathological points of view. In other words, he must prove that alcohol plays no useful part in sustaining the healthy mind in the healthy body; that it plays no part in maintaining the general health and tranquillity; while it plays an important part in producing, confirming, and transmitting disease, and in swelling, beyond any other single cause of death, not excluding consumption itself, the bills of mortality. This is the medical light pure and powerful when it is steadily upheld, and yours are the hands to uphold it. It is essentially your own light, and it illumines every one it reaches. You need have no fear that it will be put out if you bear it bravely. You may enter with it a very whirlwind if you carry it firmly. It will burn under water, but wherever it reaches alcohol it will burn that up altogether.

ALCOHOL AS A MEDICINE.

In thus exposing the action of alcohol on the body and protesting against its use as a beverage, you have not the slightest occasion to forfeit any claim as to its value as a medicine. If you can, that is to say, on truly reasonable grounds, make use of alcohol for the treatment of disease, you may most consistently do so, provided always that you clearly differentiate between the general and mischievous, the medicinal, and, it may be, serviceable use. As a beverage disclaim it; as a medicine claim it. But even in respect to the medicinal use of alcohol you cannot be too careful, you cannot be too exact, you cannot be too watchful, you cannot be too industrious. You are bound to ascertain from day to day, from hour to hour, that your practice is sure, and to determine how far you can correct it by reducing the employment of the drug to the smallest possible amount. Take care also not to exaggerate the service you suppose to spring from alcohol; "extenuate nothing, nor aught set down in malice." For be assured that in any commendation you may extend to this particular agent, such are the rank superstitions in respect to it, your lightest word in its favour will often be turned into the highest and extremest praise. Not long since I merely prescribed a small quantity of alcohol in order to make it carry another medicine, and, to my astonishment, soon afterwards my prescription was shown up in a crowded drawing-room as a proof that I depended on alcohol in the treatment of disease, and that it had proved of the utmost value. The mean device would have succeeded had not a clever lady who could read prescriptions,—and there are many such in these days,—discovered and exposed it. You

will be subjected to the same kind of comment, and you must be ready with the precise and practical reason for prescribing it, whenever you employ alcohol in an exceptional manner as an exceptional instrument.

As far as my experience goes—and it extends now over a long series of years—you will have very little difficulty on this score. You will see, day by day, as you emancipate yourselves from old trammels, less and less necessity for prescribing alcohol; while, you will find it perfectly straight and simple, if the occasion for it should arise, to protect both your principles and yourself from any suspicion of inconsistency or double-dealing. Conceal nothing, reveal everything; and understand in your mind all you mean as you describe it to others, then all will go well. The method in this concern is the same as in the composition of a sentence in writing. When you are composing and have written down a sentence, read it and revise it until you are absolutely certain that you yourself understand it at a glance. Then you may be sure that every one else will understand it. The same rule applies to the employment of other drugs than alcohol; but the doctor who belongs to the school of abstainers requires it most frequently.

It was another source of the greatest pleasure, in reading the essays which have been sent in for competition, to observe how exceedingly temperate all the writers have been in exposition of their argument. I strongly advise you to keep up this spirit, and tone, and style. You who claim temperance as your password should surely hold by it in your contests. You have no reason for any other course, and you weaken yourselves by following any other method of argument. You have always supreme nature to rest upon, and her

teachings at your command. You, therefore, need never rebuke. She, your mistress, will do that. You remember the beautiful old story, which, whether you accept it as literally true or symbolical, is equally beautiful and equally instructive, that when Michael the great Archangel contended with the Devil for the body of holy Moses he raised not against him a railing accusation, but said, "The Lord rebuke thee." You can follow that example. There is not the slightest need, I assure you, in any argument on our side of the matter, to raise a railing accusation. If we simply keep to natural fact, nature will do the rebuking irresistibly enough.

MEDICAL FORECAST.

Hitherto I have spoken to you purely on the medical, practical side of the temperance question. I must not close without uttering a few sentences on another side. You are going to be practitioners of the science and art of healing. Let that be your first care. Hufeland, the editor of the famous *Hufeland's Journal*, once the bright sun of medical learning; Hufeland, one of the purest, justest, wisest souls who ever laboured in our department of human knowledge, said of himself: "Not only with my understanding, but with my whole being, have I embraced this science; it has become my life." Take his feeling and mind as yours. At the same time take this forecast, that in the great future the doctor of medicine will have to become the *doctissima doctorum*, the learned man, the professor in and of a learned profession, the teacher of subjects far, far beyond what up to this time has been conceived to be the exclusive business of the practitioner of medicine. In all the professions the day of exclusive knowledge has passed away. In medicine it is passing away, soonest

of all, as by a swift natural gradation. Medicine, as a science, is so entirely founded on the natural sciences that any great naturalist is, *ipso facto*, two parts out of four a physician. We see this in the life and labours of the illustrious Antony van Leuwenhoek, who, since his death, in the early part of last century, up to the present day, has, from his discoveries in physiology, been claimed as a physician of distinguished mark, but who was, indeed, nothing more and nothing less, as a man earning an honest livelihood, than the beadle of the court-house of the little Dutch town of Delft. Now, these exceptions are ceasing to be such, and all educated people are becoming scholars in natural science, physiological scholars especially, to whom two parts out of four of our art and mystery are revealed. Then, again, in the scientific practice, one good part out of four is preventive and personal, that is to say hygienic or sanative, a part of medicine which has become the property of all classes, claimed by other professors of other professions, by the engineers, by the chemists, and, with a kind of longing desire to have at least a finger in so splendid a pie, by some of the representatives of the body clerical.

There remains, then, nothing more in medicine, for the exclusive part of it, than one poor fourth part, what is called the technical, the art that is required for the practice. No doubt that comes out best in those who from their earliest lives have been bred to it. But it is not a difficult art to acquire by those whose minds and hands and tongues have a good natural mechanical bent. There is so much in it that is the same, over and over again, in word, in deed, in expression, that, although it may still be an art, it is no longer a

mystery. Mystery, it is true, continues on one diploma, but it reads so badly even there that the owners of it are heartily ashamed of it.

MEDICINE TO THE FORE.

What then must become of the professors of healing if physiology be lost to them as a special acquisition, if to them sanative medicine shares the same fate, and if the art, as the special prerogative of their educational training, becomes lessened? My answer to this question is that in all these advances of learning, medicine must either keep ahead or fall into the rear. A middle place she cannot hold. With daily increasing failure of practice because there are fewer and fewer sick to be treated; with a higher intelligence daily and daily confronting and questioning you of young physic as the doctors of the future, you must either stand above the masses or fall beneath them; sit with them you cannot. You must equip yourselves to become the leaders, the teachers of the people on all subjects that relate to their health, their life, and, therefrom, their wealth and their happiness. When I joined medicine forty-three years ago such an equipment was not thought of, and would not have been considered befitting if it had been thought of. It was left for a new development, not of thought only, but of necessity, and you must accept and accredit it so that it may distinguish you if you wish to be distinguished.

Some of you have shown in your competition for this prize that in one line of the new era of medicine, physiological, sanative, practical medicine, you are prepared to move earnestly. You have done well. You have selected a line of advance which grows in force every hour, and which will be a true foundation

of health and life through the new era, not a foundation to be laid in some distant time, but one which is laid already. A few weeks since the whole world of science was startled by a report from the Registrar-General's office that the mortality of this modern Babylon, this immense London, was down for one week to the rate of thirteen in the thousand. There have been many reforming and refining causes for this happy presage, but amongst these causes, temperance is of the first. In London, drunken, gambling, riotous, dirty from drink; in the London of forty years ago, all the Sanitarians and all the Doctors put together could not have produced such a result. And, the more successfully you teach temperance, absolute temperance, the sooner will that grand result be the ordinary instead of the exceptional proof of triumph of life over death; of the veritable accomplishment of that which is written, Death is swallowed up in victory.

Towards that mighty victory which you are armed for, I direct your watchful, wondering, eager gaze to-day. It is to war, nevertheless, that I call you, and you must fight till victory comes. It is my mission to call you to it; it is yours to follow. Choose for yourselves, but let there be no misunderstanding as we start forth together. "Do I say that I come to tie you to this war? No! But this I do say, that if with me you would prosecute this war, prosecute it vigorously, or don't do it at all. I think it my duty to deal plainly, and so I say, Prosecute it vigorously."

*ON PULSE TRACINGS AND CARDIAC
SOUNDS WITH THE BODY INVERTED.*

THE Opusculum in the last number of THE ASCLEPIAD on sphygmographic tracings in different positions of the body, has led me to inquire what would be the change in the pulse tracings and in the sounds of the heart, in man, at a time when the body is completely inverted, in other words, when the person who is under observation is standing on the head.

The first observation I made on this subject was on November 25th, 1885, Mr. P. F., a student of medicine aged nineteen, offering himself as the first for observation. An apparatus was extemporised from the library ladder, and answered fairly well. In the standing position the radial pulse of this gentleman numbered 66 beats per minute; in the sitting position 62; in the recumbent 58. The pulse action was regular. The respirations were 16 in the minute in all positions.

Pulse tracings were then taken from the right radial artery in the standing, the recumbent, and the sitting positions, under a pressure on the artery of three ounces, which was the full pressure that could be borne. The ascending line, measured by my standard scale, gave four degrees; the first descent gave three degrees, followed by one other ascent of half a degree

and by one long descent, prolonged four degrees to the close of the completed circuit on the base line. In the sitting position the first line of ascent was three and a half degrees; the first descent two and a half degrees, followed by one other ascent of half a degree, and by a second single descent of five degrees. In the recumbent position the first line of ascent was two degrees; the first descent was one degree, at a very slight angle, followed by an almost continuous descending and unbroken line of six degrees to the completion of the circuit. By all these readings, natural in their changes in the different positions, there was seen to be an arterial resistance which amounted to one-third above the natural balance. The heart, slow in its movements, was feeble as compared with the arterial tension,—a condition very common with those who are athletes, like the subject of these observations, who, in one mode of physical exercise, stands at the head of all amateur competitors.

The next observation on this gentleman was made with his body inverted, after it had remained so for three minutes in order to get into proper and easy repose. There was no difficulty in taking the tracing; and three ounces still remained as the full pressure. The tracing was entirely changed. The first ascending line measured five degrees; the first descending, making an acute angle, measured three degrees; a second ascending line made one degree; a second descending line made one degree; a third ascending line made one degree; a third descending line made one degree; and from that another ascending and descending line of one degree each, terminated in a final descent of three degrees to complete the circuit. The pulse had become trichrotic.

To ensure accuracy, the pulse tracings were repeated three times in each position, with the same results.

At the same time observations were made, by auscultation, on the sounds of the heart in the different positions. In the standing, sitting, and recumbent positions the sounds were normal. With the body inverted the first sound was reduced in quality of tone; while the second sound was intensely accentuated at the base of the heart, with a faint indication of reduplication.

RESEARCH WITH A SPECIAL APPARATUS FOR INVERTING THE BODY.

In order to carry on this inquiry with greater facility, I constructed, after the observations detailed above, an apparatus in which the body can be inverted without pain or other inconvenience beyond remaining for a few minutes with the head in the lowest position.

The apparatus consists of a cradle swinging, like a large looking-glass, between two upright pillars. The person who is under observation is first made to stand in the cradle in the natural way, in which position a pulse tracing is taken. He is then put at an angle of 45° , with the head still uppermost, and is retained there for a second reading. Next he is placed entirely recumbent for the same test. He is afterwards brought to an angle of 45° , with the head downwards, while a fourth reading is taken. Lastly, he is brought down until the body is completely inverted, for the final reading or readings to be obtained. In order to prevent too much pressure on the head, the shoulders are made to rest on cushioned supports nicely adjusted; and, in order to keep the body from falling forward, the lower limbs and trunk are sustained by straps which

are passed round them to the bars at the back of the cage.

On December 3rd, 1885, I repeated this research on two other young gentlemen, who were good enough to allow themselves to be the subject of experiment, using this time the new apparatus. In one of these, Mr. C. S., aged twenty-three, the pulse readings in the standing, sitting, and recumbent positions were nearly of standard correctness. In this, as in the previous instance, the pressure of three ounces was the full that could be borne, and was maintained in all positions. The readings were taken from the right radial pulse, and were five in number:—1. From the body standing erect. 2. From the body leaning back at an angle of 45° , with the head upwards. 3. From the body in the horizontal line. 4. From the body at an angle of 45° , with the head downwards. 5. From the body inverted, that is to say, resting on the head, with support for the shoulders.

To illustrate the changes which took place through these positions I have had the different readings, or sphygmograms, carefully engraved in the succeeding figures.

Tracing from the body in the erect position.

In the first of the tracings (fig. 1) the pulse has written what may be taken as nearly a standard of a healthy circulation. If it be compared with the standard which I obtained from twenty-five readings of the radial pulse of healthy men, ASCLEPIAD, Vol. II., p. 197, we find how true it is to that representation. The number of beats per minute were seventy-two, and regular. The outgoing stroke is equal to the distance of the rest of the circuit. The ascending trace or ventricular impulse, maintains, as will be seen, its base line, and is of the

normal height of four and a half degrees. The first descending trace is natural as to angle and as to length, and the other curves, through the oblique descent, are

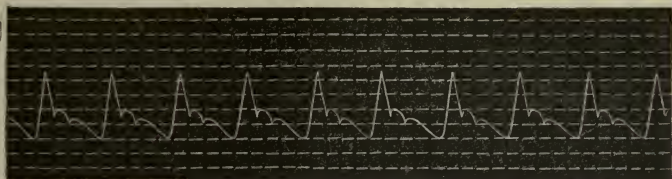


FIG. 1.

accurate. On the whole, the pulse reading tells the story of an excellently balanced circulation; the heart entirely natural, and the resistance of the arterial system well attuned to the heart.

Tracing from the body at 45°, with the head upwards.

In the intermediate position, between recumbency and the erect position, at the angle of 45°, the number of beats was reduced from seventy-two to sixty in the minute. The change in the pulse tracing (fig. 2) is sig-

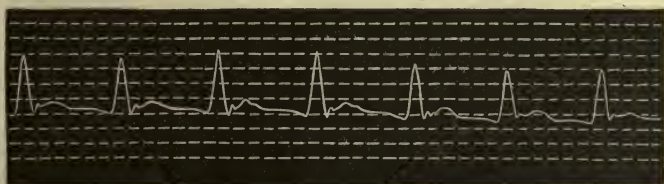


FIG. 2.

nificant. The pulse now presents full dichrotism. The ventricular stroke is irregular, being prolonged the fourth of a degree twice, and reduced one degree four times. The return events are prolonged beyond the length of the impulse. Each first descending trace descends to the base line; there is a double aortic

impulse, and after that a distance of four degrees in completion of the circuit.

Tracing from the body in the horizontal line.

With the body in the horizontal line, the beats of the pulse were reduced to sixty. The impulse (fig. 3) is reduced to four and a half degrees; the first descending

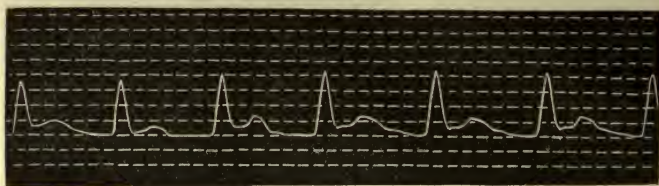


FIG. 3.

trace extends to three and a half degrees; the double aortic impulse is continued, and a distance of six degrees completes the whole circuit.

Tracing from the body at 45°, with the head lowest.

With the body at an angle of 45°, the head lowest, the number of beats was reduced to fifty-four per minute. The tracing (fig. 4) is much modified. The ventricular

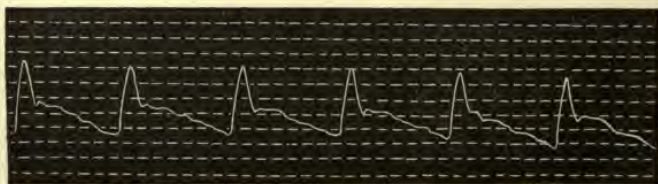


FIG. 4.

impulse extends three times to five degrees; the first descent is reduced regularly to three degrees; and, the after-curves consist of a series of three long waves, extending a distance which measures six degrees. The distance between each ventricular trace is full seven degrees.

Tracing from the body when completely inverted.

With the body completely inverted, the number of pulsations became the same as when the body was erect, namely, seventy-two in the minute. The tracing (fig. 5) is modified in a manner very remarkable. The impulse extends from five to five and a half degrees. The first descent, at an acute angle, is four to five degrees; the second ascent is half a degree; the second descent is one degree; the rise from the aortic

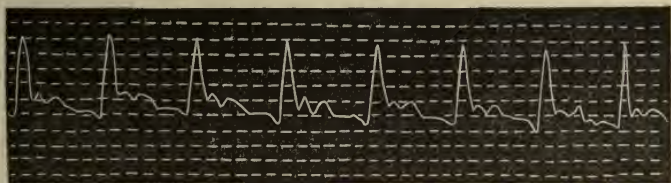


FIG. 5.

impulse is a full degree; the third descent is a full degree; and, there now occurs a new and additional event, constituting a trichrotic movement, ending in the final descent to the base line. In this position of the body the impulse distances regain their natural relation to each other, measuring the same distance as their own length, which is the perfect order.

On the same day when the observations on Mr. C. S. were made, another gentleman, Mr. A., was good enough to allow himself to be tested in a similar manner; but, as with him the same relative changes took place, the pulse becoming dichrotic in the standing position, trichrotic when the body was inverted, I do not repeat details.

In these two last gentlemen, as in the first, the heart was examined stethoscopically, with the body standing, sitting, recumbent; and in all these positions gave the natural sounds. It would have been hard to find, in

fact, any hearts more completely normal to auscultation. But again, when the body was inverted, the second sound was most sharply accentuated, with frequent distinct reduplications during what should have been the pause ; while the first sound was less pronounced than the second, as though the valvular tension producing it were reduced in tone.

COMMENTARY.

The phenomena thus recorded seem to me to have a bearing on at least two practical matters, one relating to the pulse tracings, the other to the cause of reduplication of the second cardiac sound. As regards the pulse tracings, the fact that the pulse with the body inverted gives a third or additional wave, indicates that the aortic valves, opening back after the arterial recoil has ceased, may allow a column of blood to pass their orifice, under the auricular systole and before the next ventricular systole, with sufficient pressure to cause a second back stroke from arterial tension.

In respect to *reduplication*, it occurs to me that the phenomenon of reduplication of the second sound, as we meet with it in disease, may be produced in a similar manner. In my essay on reduplication of the second sound (" Clinical Essays," Messrs. Churchill, 1861, pp. 46-52), I endeavoured to account for the phenomenon by supposing it be due to one of three causes : (a) a reverberation of the second sound ; (b) a repeated second or diastolic sound in full ; (c) a want of simultaneous action in the aortic and pulmonary semilunar valves.

On the whole, I inclined to the last of these views, and although much influenced by the admirable expositions on the subject which have come from the pens of Dr. Cockle, the late Dr. F. C. Webb, Dr. Sansom, Dr.

Barr, and other learned contemporaries, I was inclined to hold by it. I think now that a new and better explanation may be offered, derived from the phenomena observed when the body is inverted. It is quite fair to assume that in disease the same cause of reduplication may work in the same way as obtains when, during the inverted position, the weight of the blood pouring into the left ventricle from the pulmonary veins is pressing through the aortic valves upon the aorta. For example, extreme arterial resistance might have the same effect as the inverted column. It might prevent the ventricle from completely emptying itself in systole, and so give the auricle a column of blood on which to act through the aortic opening. Or, hypertrophy of the ventricle might practically produce the same result by putting too extreme a strain on the arterial resistance. Or, a too powerful ventricular contraction from excessive irritability, without hypertrophy, might have the like effect. Or, lastly, imperfect mitral closure of the mitral segment on the aortic side might lead to precisely the same double semilunar valvular action.

I could extend this commentary by referring to the phenomenon—so often met in disease—of *accentuation* of the second cardiac sound, a phenomenon which was well marked when the body was inverted. I leave this practical point of accentuated second sound, with the indication, that we may now be sure that the accentuation is due either to arterial tension reacting on a feeble ventricular systole; to extreme arterial resistance; or, to forced arterial tension from a ventricle unduly powerful in its propulsive stroke.

*WILLIAM CHESELDEN, F.R.S., AND THE
NEW ERA OF BRITISH SURGERY.*

IN the latter part of the reign of Queen Anne, during the whole reign of the first George, and to within six years of the close of the reign of George II., the one great Chirurgeon who represented chirurgical art in London was William Cheselden.

The career of this luminary in the world of physic presents many features of historical value, scientific, social, personal. He was in all these particulars a strictly representative man. He fitted in precisely with the age in which he flourished. He lived in sympathy with his age ; and, with one or two exceptions, he lived in harmony with his most distinguished contemporaries. From the masses he won admiration, from the units confidence, and from some, of whom it would have been least expected, affection.

William Cheselden was born on October 19th, in the year 1688, at the little village of Somerby, in the county of Leicester. The house in which his birth took place, though in the parish of Somerby, is two miles from the village, and forms, actually, one of the last houses in a street which seems to belong to another village, called Burrow-on-the-Hill. The house is standing,



WILLIAM CHESELDEN F.R.S.

*Facsimile Autograph from
a Volume in the Royal
Medico-Chirurgical Society
London, January 5th 1886.
BWR*

*Your most obt Humble
Sert W Cheselden*

and the visitor is to this day shown the room in which our surgeon drew his first breath. The house is still in fair preservation, and I am indebted to my old friend, Dr. John Jackson, of Somerby, for a photograph of it, which Bertram Richardson, who has also supplied the copy of the portrait accompanying this memoir, has faithfully reproduced below. Within half a mile from this house, and within view of it, is the famous Burrow



Hill, one of the grand old remains of a British and afterwards Roman encampment.

From the playground of the parsonage of Burrow, where I went to school, Cheselden's house is but an arrow-shot, and as I had the honour to be born in the same village as he, the house often set me, as one destined for his profession, wondering, in my child days, what manner of man he would be. His, conse-

quently, was the first medical life I ever essayed to write. It formed one of my series of "Our Great Ones of the Past," published in the *Medical Times and Gazette* a quarter of a century ago, and from it, with some revisions and additions, I rewrite many of the facts that are to be told in this place.

The ancestors of Cheselden were from the adjoining county of Rutland, and another William Cheselden, a relative of the surgeon, residing at Ridlington, in Rutland, was high sheriff of his county about the time when our Cheselden was at the zenith of his fame. A second relative, who was in the medical profession, was Dr. George Cheselden, of Leicester.

Of the earliest career of William Cheselden but little is known. He received a classical education, and it is probable that he commenced his professional life as a pupil of Mr. Wilkes, a practitioner of great repute, in Leicester, in the beginning of the eighteenth century. In 1703 we find him, then in his sixteenth year, in London as the house pupil of the distinguished anatomist Cooper, or Cowper—the name is spelt in both ways by contemporaries,—under whom his studies were pursued with great vigilance.

From these first studies in surgical art he passed through all the gradations common in his day, taking from the first the surgical side of the professional life as his own. This is proved by the circumstance that he became a member of the Company of Barber Surgeons, in connection with which body we shall find him playing an important part in a change which affected all the future of English barbers and English surgeons. To make himself better master of his craft, he entered as hospital pupil of the famous surgeon Ferri, surgeon-in-chief to St. Thomas' Hospital.

IN SCIENCE AND SURGERY.

Emancipated from student life, and qualified according to the manner of his time, perhaps after all the freest and best manner, Cheselden commenced his scientific career by giving readings in anatomy, by publishing an anatomical syllabus, and by pursuing a learned scientific culture.

In the month of March 1712 he presented his first paper to the Royal Society. A Roman urn had been dug up in the site of the old Roman encampment at St. Albans. The urn was inscribed "Marcus Antonius," and contained the remains of a man of extraordinary size. The bones were examined and delineated by Cheselden, and the drawings and description comprised this, his earliest, contribution. The paper occupies the third of a page in the *Transactions* of the Society, the dimensions of the parts of the skeleton forming the leading topic.

"The circumference of the skull, according to its length, was described as 26 inches, and, according to its breadth, 28 inches. The greatest diameter of each os innominatum was 12 inches. The left os femoris was 24 inches long, having only one, and that the great trochanter. The right os femoris was 23 inches long, having three trochantric processes. Each tibia was 21 inches long. If all the parts were of due proportion this man must have been eight feet high." (*Phil. Trans.*, vol. xxvi, p. 436.)

Before the close of 1712 Cheselden was elected a Fellow of the Royal Society, and in the following year he sent to the Society another paper with illustrated drawings. His descriptions in this communication are pathological, the title "Some Anatomical Observations." The observations included :—

1. A brief history of the heart of a woman who died of dropsy, and in whose aorta, at the semilunar valves, existed two chalk stones. The left ventricle dilated. The stones, the author inferred, were the cause of the dropsy.

2. A bone from the falx of a man who died of violent headaches.

3. A bone from the septum ventriculorum of a man who died hydropic, with the pericardium adherent.

4. The right optic nerve wasted and discoloured.

5. An illustration of flattening of the optic nerve from the pressure of the brain, the ventricles of which were filled with lymph.

6. An instance of three spleens taken from one body.

7. Two spleens taken from one man.

8. Two spleens from a woman. All these spleens had proper vessels, and the whole of the spleens in each case were equal in size to the one usually met with.

9. A heart with the vena azygos inserted into the right auricle, and the descending cava coming round the basis of the heart, above the aorta and pulmonary vessels, to enter the auricle, with the ascending cava.

10. A ureter, double two-thirds its length next the kidneys, and distended by stones pressing through it.

11. The Fallopian tubes in an impermeable state.

(*Phil. Trans.*, vol. xxviii., p. 281.)

In the course of this same year, 1713, Cheselden brought out his first treatise. He had, as before said, drawn up a syllabus of anatomy. He now presented his "Anatomy of the Human Body," adding the syllabus to the end of it. His reputation, already high, was greatly enhanced by this work, which ultimately went through eleven editions, and was accepted for many years as the anatomist's *vade mecum*. It cost five

shillings, was dedicated to Dr. Richard Mead, and bore on its title-page a quaint motto from Spenser :—

“Of all God’s works that do this world adorn,
There is not one more fair and excellent
Than is man’s body, both for power and form.”

The “Anatomy of the Human Body” was not intended for minute anatomists. “I have pretty much neglected,” says its author—preface to fourth edition,—“the minutiae in anatomy, nor have I been very particular about those things which cannot be understood without being seen, and being seen, need no description ; but have endeavoured to be more explicit about those which are of greatest use in philosophy, physic, and surgery.”

This promise Cheselden kept; and, although a modern student would find but little help from him, yet the book in its day was vastly superior to anything before it, and the fact, that in bringing out the fourth edition, the plates of the previous one were found to be worn out,—from three to four thousand copies were printed from them,—indicates the popularity of the work. It was the author’s endeavour to make it more than a mere descriptive treatise ; he supplied in it various physiological facts and theories, and even cases of disease, in order to illustrate particular points of practical instruction.

His physiological views were plain and common sense, but not original. His review on the process of digestion was perhaps the best in the work. He here destroyed effectually Pitcairne’s hypothesis on the mechanical or muscular force of the stomach—“computed to be equal to a 117,088 pound weight”—as the cause of digestion, and concluded by saying, that

"digestion is performed by a menstruum, which is chiefly saliva, assisted by the action of the stomach, by the abdominal muscles, and by that principle of corruption which is in all dead bodies; for digestion is no other than the corruption of our food, and, therefore, quantities of hot spirits, which hinder the corruption of animal bodies, hinder digestion." From this period Cheselden's brilliant professional career was fully secured. He was elected surgeon to St. Thomas' Hospital, in the place of Mr. Ferne, his former teacher, and went on his way rejoicing.

In 1717-18, as it would seem from Cheselden's account, Dr. James Douglas read a paper before the Royal Society on "The Operation for Stone by the High Method." This paper does not appear in the *Transactions* at that time, though another paper from the brother of this author, John Douglas, does appear. (*Phil. Trans.*, 1722, vol. xxxii., p. 10.)

Cheselden's mind was now turned to this mode of operation, and, in 1722, he commenced to cut for stone by the "high way," following, in this respect, in the steps of Pierre De Franco, of Lausanne, and of John Douglas, before-named.

The success which attended this operation in Cheselden's hands was considerable; and having cut nine patients with success, the operation became exceedingly popular. He was, indeed, now so eminent, that Dr. Stukeley, in writing his "Prospect of Vernometum, or Burrow Hill from the Leicester Road," inscribed it to "Wille Cheselden, *Chirurgo Peritissimo Amico*."

In 1723 he published his work on the "High Operation for Stone," prefacing it with an account of a lateral operation as performed by Professor Rau, of Leyden, who took the hint of the lateral operation from the

famous Frère Jacques. Cheselden's history of Rau's operation was imperfect, being derived rather from the statements of students of the Leyden professor, who had seen the operation performed, than from his own knowledge. In 1725 a treatise appeared anonymously, entitled, "Lithotomus Castratus; or an Examination of the Treatise of Mr. Cheselden," a severe critique, in which Cheselden is unjustly accused of plagiarising from Dr. Douglas. This critique was judged to have been written by Dr. Douglas himself; but there is intrinsic evidence that it was done by John Douglas, the surgeon, and brother of the doctor, a man of an inferior cast of mind, and whom we shall meet with again. The attack did Cheselden no injury.

In 1725 Albinus, the distinguished successor of Rau in the University of Leyden, published an accurate history of Rau's lateral operation; for it is remarkable that Rau himself left this labour undone, so that his operation might never have been known but for Albinus.

Albinus, immediately on its publication, sent a copy of his work to Dr. James Douglas, who at once laid an abstract of it before the Royal Society. From that time Rau's operation excited great attention, and on the 7th of August, 1726, Dr. Bamber made the first trial of it on the living body at St. Bartholomew's Hospital. A few days later Cheselden did the same at St. Thomas', but in a modified way, viz., by filling the bladder first with water, leaving the catheter in the bladder, and then cutting on the outside of the catheter into the bladder. He was enabled in this way, in cases where no accident happened, to perform the whole of the operation in a minute, and with unusual skill.

Ten patients were thus operated on, and four of these dying, he tried the plan originally adopted by Rau, without modification; but the same want of success being again met with, he ultimately invented that lateral operation by which his name became so well, so widely, and so long known. His first new operation was performed on three patients on March 27th, 1727. The success which followed opened a new era in surgery. Twenty-seven patients operated on in succession all recovered,—a result never before achieved.

In the fourth edition of his Book on Anatomy, Cheselden added an appendix, describing this new operation, and, as his mode of operating has often been commented on, it will be satisfactory to follow him by giving his own description :—

“This operation I do in the following manner. I tie the patient as for the greater operation, but lay him on a blanket several doubles upon an horizontal table, three foot high, or a little more, with his head only raised. I first make as long an incision as I well can, beginning near the place where the old operation ends, and cutting down between the musculus accelerator urinæ and erector penis, and by the side of the intestinum rectum. I then feel for the staff, and cut upon it the length of the prostrate gland strait on to the bladder, holding down the gut all the while with one or two fingers of my left hand. The rest of this operation is done the same as in the old way; but in this way there being often small vessels, I always tie them with a ligature, passed under them by the help of a crooked needle.”

The flow of practice in free current, our operator went on with fortune in full favour until 1728, when

he favoured the Royal Society with a communication which set all Europe by the ears. This paper included the history of an operation for couching, and was entitled "An Account of some Observations made by a young gentleman who was born blind, or had lost his sight so early that he had no remembrance of ever having seen, and was couch'd between thirteen and fourteen years of age."

The fame of this operation was such that to Cheselden has often been falsely attributed the merit of inventing the very old operation for the cure of cataract. But the true marvel of the case lay in the circumstance that a youth, old enough to think and describe, and who had never seen any object, explained the sensations of acquiring the gift of sight. The history of the case was painted with a skilful and artistic hand, and the sensation it created was unparalleled. (*Phil. Trans.*, 1728, vol. xxxv., p. 447.)

The operation for couching, although generally so well received, was attacked by some ill-informed writers, one of whom did not scruple to criticise it in a book, entitled "A New Method of Recovering the Sight by Putting out the Eyes."

In the volume of *Transactions* named above (page 451) will be found another short paper by Cheselden, on an operation for closure of the pupil:—"In cases where there is either a total closure of the pupil, or when the pupil is extremely contracted, and the inner edges of the iris growing to a cataract, or part of a cataract, after couching." The knife used for this operation was edged on one side only; it was thrust through the sclerotic coat, and then forward through the iris, the edge being turned to the iris. In drawing it out, the slit or artificial pupil was made.

In this same year (1728) Cheselden was elected surgeon to Queen Caroline, and in 1729 he had the honour of being elected a corresponding member of the Academy of Sciences in Paris. He may be considered now as having reached the zenith of his fame. His position was unexceptionable. He was first surgeon to the Queen Wilhelmina Caroline; first surgeon of St. Thomas' Hospital; and, consulting surgeon to the St. George's and Westminster Infirmaries. He now gave up the laborious duties of teaching anatomy, after twenty years' service, and with a success unbroken. His reputation on the Continent was as great as in this country. M. Morand, an ingenious lithotomist of Paris, and a member of the Academy of Sciences, came over to London expressly to see him operate; and so many various descriptions of his mode of operating were published, that Dr. James Douglas, with Cheselden's assistance, brought out a treatise specially devoted to a description of the Cheselden plan, "his operation and his whole operation." "Appendix to the History of the Lateral Operation for Stone, containing Cheselden's present method of performing it." By Dr. James Douglas. London: Strahan, at the Golden Ball, 1731.

Among other Parisians who visited Cheselden and saw him operate was one who afterwards, in 1757, wrote an *éloge* of him in the "*Mémoires de l'Académie Royale de Chirurgie*," and who in so doing took the trouble to obtain some biographical facts from the Cheselden family. At one operation for stone, at which this writer was present, Cheselden went through all the stages of it in fifty-four seconds. He afterwards gave his visitor the particulars of his method, on the condition that he should not communicate them until

they had been laid before the Royal Academy of Sciences in Paris. The Academy defrayed the expenses of the visitor's journey, returned their thanks to Cheselden, and commenced a correspondence with him.

In 1731 Cheselden was rather less fortunate, for he lost favour at court, and this so decidedly that, when her Majesty the Queen Caroline died two years after, from umbilical hernia, which was operated on unsuccessfully, he was not consulted. The cause of this loss of courtly favour is curious. A deaf criminal in Newgate was reprieved on the request of Cheselden, in order that he (Cheselden) might try a mode of treating deafness by puncturing the tympanum. On this point the "Monthly Intelligencer" of the *Gentleman's Magazine* for January 1731 gives the following:—"Saturday, January 2nd. Great talk of an experiment to be made on Charles Ray, in Newgate, a malefactor, reprieved on that occasion. The tympanum, was to be cut by an instrument, in order to demonstrate whether the hearing proceeds from the tympanum, or the nerves that lie between that and the conception of the ear." The man's life was saved, but Cheselden, as it is said in a letter from Ford to Swift, "neglected" to perform the operation, which gave great offence in high quarters. If I may be permitted to judge, I should infer, not that he neglected the duty he had undertaken, but that his humanity shrank from the task. He did not, on reflection, choose to revive the school of Erasistratus, and make man an animal for physiological research.

Cheselden had not long to tarry for some compensation for royal slights. The year of 1732 was made memorable to the medical world as the birth-year of the Royal Academy of Surgery in Paris. By this Society

he had the great distinction conferred on him of being elected the first Foreign Associate.

In the same year a youth, named Richard Yeo, aged twelve years, published a short poem, which is not without merit, entitled "The Grateful Patient," in honour of Cheselden, who had operated on him for stone. The poem is printed in the *Gentleman's Magazine* for 1732, p. 769. After detailing the agonies he had endured previous to Cheselden's assistance, the grateful patient thus described the operation:—

"The work was in a moment done,
If possible, without a groan,
So swift thy hand, I could not feel
The progress of the cutting steel.
Æneas could not less endure,
Though Venus did attend the cure.
Not her soft touch, nor hand divine,
Performed more tenderly than thine
When by her help Iapis own'd,
The barbèd arrow left the wound.
For quicker e'er than sense or thought,
The latent ill to view was brought;
And I beheld with ravish'd eyes
The cause of all my agonies.
And above all the race of men,
I'll bless my God for Cheselden."

In 1733 Cheselden brought out a long-promised book, the "Osteographia," a work in which he offered to his readers a delineation of every bone in the body as large as life. The "Osteographia" was dedicated to the Queen, though he must still have been in disfavour, and was published by a four-guinea subscription list. The book was as severely criticised as it was unseemingly lauded. Belchier praised it; Heister praised it; Haller showed fairly its merits and demerits, with his

usual candour. The most violent critic of the "Osteographia" was John Douglas, who, as we before saw, was possibly the author of the "Lithotomus Castratus." The critique of Douglas on the "Osteographia" was a low, unmanly, selfish production, and I am glad to correct an error often made by most biographers, that it was written by Dr. James Douglas, who, it is evident from his other writings, could have been guilty of no such a production. Some months earlier, indeed, he wrote the "Appendix" on the lateral operation extremely commendatory of Cheselden, with whom he seems always to have been on terms of great intimacy.

John Douglas' asperities were harmless. It is true that he had a few faults to find, as that os hyoides was not figured; but the critique seems to have been written rather to give its author an opportunity of advertising another "Osteographia" of his own, and of a cheaper kind, than for any more honest or useful purpose. The "Osteographia" subjected Cheselden to the infliction of some horribly inflated verses, which an unknown doggerelist presumed to offer to his honour, and which I forbear to transcribe.

In 1735-36, there lay ill in the house of Cheselden, in or near to Queen's Square, Westminster, no less a man than Alexander Pope. The following part of a letter from Pope to Swift, and retained by Nicholls, will bear reprinting, as offering an opinion on the merits of our Chirurgeon:—"As soon," says Pope, "as I had received your last letter, I received a most kind one from you expressing great pain for my late illness at Mr. Cheselden's. I wondered a little at your queræ who Cheselden was? It shows that the truest merit does not travel so far any way as on the wings of poetry; he is the most noted and the most deserving

man in the whole profession of chirurgery, and has saved the lives of thousands by his manner of cutting for stone." Curiosity-seeking Nicholls has also another letter, written by Pope to Cheselden.

"Dear Sir,—You know my laconic style. I never forget you. Are you well? I am so. How does Mrs. Cheselden? Had it not been for her, you had been here. Here are three cataracts ripened for you (Mr. Pierce assures me). Don't tell your wife that, * * * Adieu. I don't intend to go to London. Good-night; but answer me. Yours, A. POPE.

"Bath, November 21.

"P.S.—Show this to Mr. Richardson, and let him take it to himself and to his son; he has no wife."

This has reference to Jonathan Richardson, the celebrated painter and writer on art, whose famous portrait of Cheselden adorns the Council Room of the Royal College of Surgeons. The figure is clothed in red, as was the usual custom with this artist. By good fortune Mr. Charles Hawkins saved a splendid engraving of this portrait by Faber, and presented a copy to the Royal Medico-Chirurgical Society.*

In the year 1737 Cheselden was appointed chief surgeon of Chelsea Hospital. He took office in February, and retired from active practice, though he still seems to have operated occasionally for other surgeons. His income from practice is unknown; had it been very large, he would scarcely have accepted the Chelsea appointment. Some of the original shares of old Putney Bridge, of which he is said to have been

* The Society is also indebted to Mr. Hawkins for the book containing the autograph of Cheselden, which, presented originally to Surgeon Macgill, of Edinburgh, passed through the hands of Prout and Brodie to the learned and generous donor.

the architect, were held by him. The bridge is now being removed and replaced.

In 1738 his old pupil, Samuel Sharpe, dedicated to him his treatise on the "Operations of Surgery," in recognition of his claims as the ornament of his profession; and, in 1742, another grateful patient, in the person of Mr. Wynne, a commoner of Jesus College, Oxford, from whom he had extracted a large stone, blew at him a third poetical effusion, which might have turned the head of a man of weaker cast.

As surgeon-in-chief to the Chelsea hospital time would now run smoothly with our Cheselden; but he still took an active part in many professional movements, and perhaps most of all in the separation of the Surgeons proper from the Barbers proper, up to his time allied, as one body, in the Barber Surgeons' Company. By the kindness of my good friend, Mr. Shoppee, I have been enabled, from the records of the Company, still preserved in Barbers' Hall, to discover a minute which shows that in 1744 W. Cheselden, Esq., was one of the wardens of the Company. His name stands with those of his colleagues as follows: Jonathan Medley, *barber*, as MASTER; Joseph Sandford, *surgeon*, Humphrie Negus, *barber*, and W. Cheselden, *surgeon*, as WARDENS. Two surgeons and two barbers were, it seems, the Chiefs, by rule, at this period.

Sandford and Cheselden were the two last surgeons who were combined in this alliance. At the time I have specified, 1744-5, the grand separation between surgeons and barbers took place. The surgeons moved over to their new hall in the Old Bailey, while the barbers remained in the old hall as the Barbers' Company, still alive. In the following year, supported by barbers as wardens, Master Jonathan Medley, *barber*,

remained at the head of his Company, and Cheselden was seen there no more.

In 1746 our surgeon-in-chief reported the case of a man, aged seventy-six, who was treated for stone by the *lixivium saponis*, or *soap lyes*, made, as I find, from the Pharmacopœia of that day, by adding together equal weights of potash and quicklime with water. In the bladder of this patient, who was a pensioner at Chelsea Hospital, were found 214 stones, varying in size from a pea to a nutmeg, and weighing altogether six ounces two scruples. (*Phil. Trans.*, vol. xlv., p. 36.) About the same period Cheselden operated on a patient for stone who was under the care of Mr. Reid, a surgeon, of Chelsea; and was led in this case to observe, for the first time, that a piece of wetted sponge pushed into a bleeding wound powerfully arrested the loss of blood, and sometimes did away with the necessity for ligature. (*Phil. Trans.*, vol. xlv., p. 33.)

The last important professional work of Cheselden was performed in 1749, and consisted in editing an English edition of the "Operative Surgery" of M. Le Dran, with remarks and drawings of instruments. It was well done.

DOMESTIC AND SOCIAL.

Early in his career Cheselden married Deborah Knight, the daughter of a citizen of London. By her he had an only child, Williamina Dorothy, who married Dr. Charles Cotes, M.D., of Woodcote, Shropshire, sometime M.P. for Tamworth. Mrs. Cotes outlived both her husband and father, and died, without issue, at Greenhithe, in 1763. Mrs. Cheselden outlived them all. She survived until 1764.

Indefatigable Nicholls, rooting out dead gossip, gives

us a few anecdotes of our Chirurgeon, which are interesting even in their childishness. Having tied a child up for lithotomy, Cheselden offers it sugar-plums if it does not stir. The operation is performed with so little pain that the patient immediately demands the fulfilment of the agreement.

A friend saying to Cheselden at dinner, that, as he was the best anatomist in England, he ought to be the best carver, he answered, "I am."

In a conversation at Dodsley's, Cheselden remarked to Pope that he wondered at the folly of those who could imagine that the fourth book of the "Dunciad" had the least resemblance in style, wit, humour, or fancy to the first three books. Pope undeceived and mortified him by saying that he himself was, nevertheless, the writer. The same unhappy mistake happened between Mallet and Pope. Between Pope and Cheselden the tie of friendship must have been very strong. In the "Imitations of Horace," verse 39, we have again a reference to Cheselden from Pope:—

"I'll do what Mead and Cheselden advise,"

while Jonathan Richardson writes to Pope, at Twickenham, after recovering from illness:—

"Cheselden, with candid wile,
Detains his guest; the ready Lares smile.
Good Chiron so, within his welcome bower,
Received of verse the mild and sacred power,
With anxious skill supplied the best relief,
And healed with balm and sweet discourse his grief."

Rapid and dexterous as he was in the practice of surgery, Cheselden was exquisitely nervous up to the very moment when he commenced to operate. Before operating he was sick from anxiety, and as the

moment approached was pale from fear. But the instant he commenced his work all fear vanished, the hand was electrified with skill, and the operation was perfect.

One day a curious bit of gossip found its way to the court, then a centre of gossip. A French surgeon being at St. Thomas' with Cheselden on operation day, was surprised at what he thought to be weakness on the part of his friend. Afterwards the visitor induced by his host to go to the fencing-school, in which the host delighted, showed weakness on his part, could not bear the sight, was taken ill, and had to be removed.

On May 7th 1757 Cheselden sent to the Foundling Hospital £50, enclosed in a paper with the lines from Pope:—

“ 'Tis what the happy to the unhappy owe,
For what man gives, the gods by him bestow.”

PERSONAL.

Our portrait of Cheselden gives us an admirable idea of the man altogether. He was of nervous lymphatic temperament; a steady worker, and a sound practical thinker; a genial friend; an artist, drawing many of his own plates for his illustrated works; an anatomist; a surgeon, ingeniously mechanical, fairly industrious, and heart and soul in all he undertook to do. Socially, he was a man much beloved, and fond of all things that make life light and joyous.

In the latter part of the year 1751 Cheselden had a paralytic seizure. He recovered, as it was thought, perfectly. On the 10th of April, 1752, being then at Bath, he partook, according to the news of the day, too heartily of ale and hot buns. Finding himself ill, he sent for a physician, who ordered an emetic; the advice

was not followed, and the death stroke this time fell sure.

By his own direction, the remains of William Cheselden were laid in the burial ground of Chelsea Hospital; and there, on the north side, was raised this last record:—

“GULIEMUS CHESELDEN,
Natus 19 Octobris, An. Dom. 1688.
Obiit 10 Aprilis, An. Dom. 1752.”

The effects of our Surgeon passed into the possession of his nephew, Colonel Cheselden, who, according to the report current in my young days, died in the early part of this century at Somerby Hall. One of these effects, an oil painting by Panini, was bought at the Colonel's sale by my maternal grandfather, Richard Ward, and is still in my possession. I remember once seeing Cheselden's professional gown, a case of calculi, and a box of his operating knives, which had also come down from Colonel Cheselden's sale. They were the property of the much-respected landlady of the Three Crowns, Mrs. Bull, long since dead, with, I fear, all her family. A quarter of a century ago, when my first life of Cheselden was in hand, I induced Mr. Henry Hudson, of Somerby, who was then in practice there, to endeavour to obtain these relics for me. He did his best, but without success. I still hope to have the good fortune of finding them, and of placing them in the home where they ought to rest, that Royal College of Surgeons of which their original owner was a Founder and *Primus inter Pares*.

OPUSCULA PRACTICA :

USEFUL NOTES FOR BUSY PRACTITIONERS.

“There are mites in science as well as in charity.”

BENJAMIN RUSH.

MORTALITY INCIDENT TO PUBLIC LIFE.

HE essay on diseases incident to public life in last ASCLEPIAD, while it has caused much public comment and some necessary criticism, has only proved itself too true as a physician's prognosis. Six deaths are reported as directly traceable to what the *Lancet* has correctly called “the election fever.” But these deaths are as nothing compared with the physical injury leading towards death that has been produced. I should say that few of the men who have taken an active, not to mention a violent, part in the recent election, have passed unscathed. Every one has lost something beyond the ordinary natural loss of vitality, and many have sustained injuries from which they will never recover, injuries, silent it may be in character, yet such as would reduce the commercial value of life most materially,—if it were estimated on an examination for life insurance,—as compared with the value it would have presented previous to the time when the electioneering campaign was commenced. This applies even to men who by a rude standard may

be called healthy. It applies with much greater force to men who were already labouring from some forms of chronic disease, such as diabetes, irregular or feeble circulation, insomnia, and organic nervous exhaustion.

There is another evil connected with the electioneering excitement and vital failure, an evil remote, no doubt, but most important. During those days of commotion hundreds of human beings of the future received their first implantation of life, many of whom, begotten of the election fever, will inherit an aptitude for nervous aberration which will influence them through the whole of their mortal careers.

The results of the present election, owing to the tension of political strain, have been worse than could have been expected. And what for? Numbers of enfeebled and uncertain hearts have been sent into the House; numbers of anxious and wearied minds; numbers of men who might well exclaim, Hail, St. Stephen! those who wish to die salute thee! But how much of knowledge, wisdom, and true statesmanship will develop there under the sleepless, excited, restless labour is a question which the physiologist will of all men be the last to answer hopefully.



INFLUENCE OF FOREBODINGS IN DISEASE.

THERE is no occasion to summon up any superstition in order to study the influence of forebodings on the sick. These forebodings are of two kinds, the fanciful and the serious, and must be differentiated accordingly. False forebodings are presented by persons who are of flighty or fanciful natures, who are really fond of contemplating risks

and dangers, and who, in a half hysterical manner, will first suggest the anxieties, and a few minutes after laugh at the whole matter. Of these, whose natures are easily detected, nothing need be said ; their forebodings rarely have any importance beyond the conversation.

True or serious forebodings are entirely different in character, and ought not to be totally disregarded. They emanate from persons who are firm and thoughtful, who do not speak until they have made up their minds, and who, as a rule, conceal or keep to themselves what they have on their minds, until something like a crisis seems to have arrived, when they come to a conclusion, announce the fact, and are obviously influenced by it. The forebodings take various forms. One man believes he has an unlucky day or month, and that something always happens to him at these particular seasons. Another thinks he has received a premonition that the illness he suffers from will be his last. A third is affected by something that has been told him, or, as he says, foretold him. In any case, the effect is, unquestionably, bad, and if there is one symptom to be disliked in critical disease it is this one ; it evades argument ; it is beyond persuasion ; and, it has direct effect upon the physical powers. There is, under the condition of mind specified, a diminished action of the heart, an indifferent digestion, and a feebleness of muscular tone, which, together, are as strongly, as insidiously, opposed to restorative efforts. Fortunately, the preconception is, as a rule, a false alarm. But I have more than once known an instance in which the supposed premonition has exerted an unfavourable if not, strictly, a fatal influence.

As to the way in which the foreboding is to be met by the physician I am of opinion the wisest course is

to take as little notice of it as common and sound courtesy will permit. To argue against it is too often to encourage the idea, or to be drawn into arguments or quasi-admissions, which are afterwards twisted into confirmation of the belief; while to speak in favour of the idea is to clench it. Ridicule, also, is, I am sure, very bad in its influence, and so, on the whole, on this point of practice silence is golden.

As directly bearing on this subject I may mention that in many of these forebodings there is a continuous undercurrent of the old astrological beliefs, not yet eradicated, and that this not unfrequently takes an acknowledged expression. During the present year a gentleman, whom I saw several times in consultation during his fatal illness, predicted, "from his horoscope," his own fate, and held to the prediction up to the end as a professed believer in what he designated "the tabooed but living and true astrological science."

A SIMPLY CONSTRUCTED ANTISEPTIC DISSECTING-BOX
FOR PATHOLOGICAL AND ANATOMICAL SPECIMENS.

N conducting *post mortems* it is often difficult to place specimens, that are intended to be kept for future examination, in such a way as to keep them in good position, fresh, and accessible. To meet this demand I have constructed a wooden box, which any carpenter can make, and which answers extremely well. The box measures twelve inches in length, six in width, and three in depth in the clear. It is divided in its depth into two equal parts, so that it can be opened in its middle, as if it were two boxes, each one and a half inches deep; but when the two parts are joined, they make one air-tight box, by means

of a nicely fitting groove in one part, and a projecting ledge in the other, which fit firmly together. For convenience of carrying, the box is provided with a handle, counter-sunk, in each half.

The specimen, when the box is being used, is neatly laid in one half of the box, and is treated with from twenty to thirty minims of strong solution of ammonia, which may either be dropped upon the specimen or upon the floor of the box. Then the loose half of the box is placed over the half containing the specimen, is pushed firmly into its place, and is secured by hook and eye fastenings at the end of the box. The specimen is now safely preserved for a month at least, and will often retain not only its natural shape and consistency, but also its natural colour.

In examining or dissecting the specimen, it is not necessary to turn it over with the hand. As the box divides equally, it is merely requisite to replace the half of the box that has been removed, turn the whole over, and take off that half of the case in which the specimen has previously rested.

The case here described is large enough to hold such a specimen as the heart with a portion of lung. In order to render it capable of holding smaller structures in a separate form, there is in it two movable partitions, which admit of being set at different distances from each other, so as to make distinct compartments for different organs. This box is useful both for pathological and anatomical work. The operator can use it as the holder of the specimen while making the dissection, and if he is called away, he has only to replace the disconnected half of it. All is then secure until the research is resumed.

*ON COLD FOODS AND COLD IN STRICTURE OF THE
ESOPHAGUS.*

IN the treatment of stricture of the esophagus it is of moment to impress on the patient the importance of eating and drinking all foods and drinks cold. I learned this fact of a very intelligent sufferer from stricture, she having obtained the knowledge from her own personal experience. She found that if foods in the minced form, or if drinks like milk, were attempted to be swallowed when they were hot, they always gave pain, and were often returned without the passage of the least portion into the stomach. She also found that the constriction was intensified by the effect of the heat upon the mucous surface. On the other hand, she noticed that if she essayed to swallow the soft food while it was chilled, or cold, it passed readily, and she could feel it making its way along the esophagus into the stomach.

The observation in this case was so clear and practical that I have kept it in view, and acted upon it ever since ; and only a few hours before this opusculum was written, I have seen its value. A patient with stricture in the upper third of the esophageal tube, and who for two days had returned all warm foods and drinks, was able, by swallowing them cold, to drink and pass into the stomach half a pint of fresh milk. The reason of this result is, I think, as sound as the experience itself. The heated foods tend to produce contraction of the circular muscular fibres of the esophageal tube, while cold has the tendency to relax them. Heat irritates, cold acts as a sedative ; heat excites pain, cold soothes.

The suggestion opens the way to the introduction of many nourishing, as well as pleasant foods in this

disease, for which feeding is the one and chief remedy. Iced milk, iced creams, iced jellies, and iced beef essence, are all acceptable, in this condensed form.

One further and last practical act has evolved from this idea of cold food; namely, that of using a cold, instead of a warm, tube in attempting dilatation of the stricture. Any one who will try the experiment will find how much more easily a cool than a warm tube enters the constricted part, and passes through it. I now always immerse the dilator in chilled butter for a few minutes before using it, and with undoubted advantage. Oil would do, but butter is less objectionable, and is more easily cooled by contact with ice.

AUSCULTATION OF JOINTS IN CHRONIC JOINT AFFECTIONS.

IT is a good point of practice to make auscultation of the joints in disease, and with the double india rubber stethoscope this is now an extremely easy and accurate proceeding. If the stethoscope be placed over a large or small joint of a young and healthy person, the joint can be flexed or moved in any possible direction that it admits of, without giving out any sound except a very soft rub or friction quite glutinous in character. But if there be any dryness of synovial membrane or thickening, then a loud friction sound, sharp or coarse, not only indicates the seat of mischief, but to a large extent the nature of it. A dry, sharp, clear friction sound means, as a rule, thickening of synovial membrane with cessation of exudation. A coarse sound indicates solidifying deposit. Both sounds are in most cases accompanied

with pain during movement, and with difficulty of movement as well as pain.

In some instances of severe pain in a joint over which tendons pass, as at the foot and wrist, the pain assumed at first to be in a joint is diagnosable by the stethoscope as being in the sheaths of tendons. Under careful auscultation in such instances it is deducible from the sound that the friction is not in the joint at all, but extends along the sheaths of several tendons, or it may be only along one sheath,—a very important detail to discover in regard to practice.

Again, in cases of pain auscultation may be made the means of determining whether the pain is neuralgic, or is dependent on membranous friction. In a case which for a long time I took to be an obstinate sciatica I found on auscultation of the hip joint that there was a distinctive dry friction within the joint, and that the sciatic pain—reflex from the joint—was at once relieved by absolute rest. Lastly, in a case where it was a question in dispute whether the person who complained of pain in the foot was really suffering or was dissembling I was able to get assurance that the pain was real by detecting on auscultation a sharp friction sound along the course of the tendons, with the pain most acute at the points where the sound was most distinctive. In another and somewhat similar case it became easy to differentiate by auscultation between what was thought to be an injury to the ankle joint, and a painful condition of the foot, of rheumatoid, or gouty, rather than of traumatic origin, arising from friction when there was any movement of the tendons.

HYDROPHOBIA.

I HAVE been recalling, recently, how many times in the course of my life—which from the earliest days has been in medical service—I have seen cases of dog bites the histories of which were fully known to me. I have, no doubt, forgotten some that would be trivial; of others sufficiently important to come under systematic treatment, I have good memory of eleven. Of these eleven, nine gave no great cause of alarm, because the animals that inflicted the bite were considered healthy; but in two instances much alarm was excited for the reason that the animals inflicting the bite were considered, on as fair evidence as is usually attainable, to be distinctly and furiously rabid at the time. On these last examples I would offer one or two notes which at this particular time have a bearing strictly practical.

A youth about sixteen years of age was riding his bicycle in a suburb of London. He heard behind him a loud shouting; and, looking round, he saw a dog pursuing him, the dog itself being followed by two policemen and other persons. The officers were shouting to the youth to get out of the way. He, at once, rode his bicycle up to a garden wall and essayed to mount on the wall, but was either too late or too unfortunate in the attempt, for the dog, leaping up,

gripped his hand and inflicted a crushing bite, the teeth of the animal meeting through the flesh. The flesh was much torn, and blood flowed freely. At this juncture the police came up, struck the animal down with their staves, and killed it.

The injured youth was at once directed to a neighbouring chemist, who in the promptest manner took the painful but sound steps of pouring some strong solution of ammonia into a clean mortar, of immersing the bitten hand directly in the solution, and of holding the hand there for from one to two minutes. He then wrapped the hand in cotton wool, and, writing down what he had done, put the youth into a hansom cab and sent him to me. I removed the cotton wool; placed the divided parts as neatly as possible in apposition, without a stitch; painted the bitten surface with iodised colloid; placed the hand, covered with cotton wool, in a splint; and left it untouched for seven days. At the end of that time I found, on removing the dressing, the wounded parts nearly healed. Another similar dressing was applied, and within a month there was complete recovery.

No symptom of hydrophobia occurred, and five years afterwards, when this patient came to consult me on another subject, he reported that he had enjoyed uninterrupted good health. It was ascertained that the dog which inflicted the wound had not only been diagnosed as rabid by a competent veterinary surgeon, but had become rabid by having been bitten by another rabid dog, and had communicated rabies, by biting, to a third dog. He was on his way to be killed because rabid, when, after making his escape from the police officers, he rushed at my patient, who so fortunately recovered from his bite.

A middle-aged woman who acted as housekeeper to a gentleman in business, not very far from my residence, is the subject of the second record. She was bitten in the lower part of the leg by a dog which ran down the area steps of the house in which she lived, and made its way into the kitchen, where, after it had injured her, it was followed, captured, and removed as a rabid animal that had bitten two other animals.

The bite in this instance was less severe than in the previous case, but it was a deep and nasty bite and tear. The wound was treated immediately with lunar caustic, and after her first surprise the sufferer regained her spirits, and tried to keep the fact of the accident out of her memory. The wound healed without medical attendance, but one morning, sixteen days later, she was brought to me in a cab in a state of the wildest excitement and trepidation. She had herself no doubt that she was affected with hydrophobia. Her account was that she had gone to bed the night before feeling quite well, but had dreamed she was suffering from this terrible disease, was awakened by an acute pain in the bitten place, and was horrified to find that the symptoms she had dreamed of did actually continue. She was unable to open her mouth without great difficulty; she could not drink; the slightest tinkling noise gave rise to a kind of convulsive seizure; she declared herself unable to walk; and, she made the most painful grimaces. To have declared this woman as suffering from hydrophobia would have been no grave error, but I wouldn't accept it. I told her at once, authoritatively and absolutely, that she was wrong. I dismissed the vehicle in which she had been brought on the ground that it was unnecessary to keep it waiting. I explained to her that as the period of

incubation for hydrophobia was forty days, and she had been bitten only sixteen days ago, she could not be suffering from hydrophobia. I assured her the symptoms were those purely of hysteria, caused by dyspepsia from an imprudent late supper; and, touching the spot where the wound had been with iodised colloid, with a special assurance of the protective value of that remedy, I dismissed her to walk home and to return to me the next morning, declining flatly, and as preposterously unnecessary, her request that I should visit her professionally in the latter part of the day.

Next morning I had another visit from this patient. She was now in a more satisfied turn of mind. She was, she felt, decidedly better; she had slept fairly, and had managed to get down some milk and minced food with less choking. She had also much less pain in the wound. In a word, she only wanted further assurance, in a potential dose, that she was safe, and that she got. She recovered and lived for many years without any return of the symptoms which gave her so much trouble and natural alarm.

I feel sure that these experiences are of a kind which every other medical man who has been in practice for twenty or thirty years must also have had. I put them forward with the expectation that they will be fully and freely reconfirmed, and this, indeed, is the first object I have in view. But I have yet another, not less important and practical.

It is not to be wondered at that one who has observed carefully such examples as those above recorded should hesitate long and thoughtfully before he accepts the statements so often advanced of the discovery of some specific prophylactic or remedy for hydrophobia.

To my mind no proof of such a discovery could be made certain under an extension of observation of any less period than ten years. Even then such a number of proofs would have to be collected as would require a corps of independent and competent observers. Take the two illustrations above cited as in point, and compare any assertion made respecting their apparently successful treatment with some other kind of assertion that might be acceptable respecting some other form of treatment, more popular but not more demonstrative.

If, for argument, I declared that for my two patients iodised colloid, or ammonia, or lunar caustic, had proved the specific cure, who would believe? But if in the course of the past two months I could report the same results as following upon inoculation, how many would not only believe, but magnify belief?

Cæsar is Cæsar still. "*Fere libenter homines id quod volunt credunt.*"

There is another point connected with hydrophobia, at the present time, which seems to me of very serious moment. I cannot allay the suspicion that under the head of deaths from hydrophobia there are included deaths from other causes, occurring after bites from dogs, which deaths would have occurred if there had been no bite at all. I heard recently of the death of a boy of twelve from symptoms which I should have diagnosed, in the absence of a dog bite five months before the fatal illness, as a death from tubercular meningitis; and, I have read of other cases in which, if there had been no similar preceding injury, some other diagnosis than hydrophobia would easily have been offered in explanation of the cause of death.

Are we then on safe ground, in cases where long

after a bite death takes place with symptoms of nervous disturbance, in coming to an instant diagnosis that because of the accident, and because some of the symptoms are like certain of the symptoms of hydrophobia, therefore the death must be registered as from that disease? I do not think we are on safe ground, and I fear that unless more than ordinary care be now taken, in doubtful cases, to verify the cause of death by skilled *post mortem* examination, we shall have false alarms and a series of false returns on this matter. Our Coroners should look to this carefully, and check instead of encourage the growing idea of an actual increase of false or doubtful returns. They should remember that, as hydrophobia is an affection on the border-land of mental aberration, and as many thousands of people are living who have been bitten by dogs and carry the marks of the wound with them, it would be the easiest thing in the world to excite a panic that would produce an epidemic like the tarantism of the fifteenth century, and more fatal. That I am not too exacting on this topic I can again illustrate from clinical proof. I know a man at present who, some months since, was bitten by a dog. The fact is never off his mind. He is in constant suspicion, if any nervous symptom affect him, that it is the premonitory symptom of the awful malady. He is quite well physically, and shows but a slight scar at the bitten part. But a mere touch of any organic nervous disturbance would throw him into a mental state which would suggest some symptom he most dreads. And who shall decide between the real and the ideal, between the moral and the physical contagion?

On the question of the treatment of hydrophobia by inoculation I, for my part, must hold a most cautious

reserve until much clearer and longer confirmed evidence of its efficacy, than we at present possess, has been abundantly afforded. If the practice be ideal—and it may be—it is dangerously mischievous without reason. If the practice be more than ideal, if it be founded on evidence proving it to be a means of cure, it is still, though very important, subservient to the true and only perfect remedy, that of marching up to cause at its prime source and stopping it there. The virus moving on four legs can easily, by sound and practical legislation, be stamped out the moment it appears, and by careful study as to its mode of development may be checked during its development. The virus artificially cultured, if it can be, and distributed for inoculation, though it should prove ultimately a cure, would still be secondary to direct prevention, and by making the world careless in respect to prevention, might easily do more harm than good.

One result, however, might certainly come out of the success of the mode of cure by inoculation of artificially produced virus. It might give the homœopaths a triumph they never had before. In it their dogma *similia similibus curantur* would, to their minds, be reconfirmed, while their idea of increase of potentiality by attenuation of substance would have a corroboration *sine invidia*.

EXPERIMENTS TOWARDS THE ANIMAL BATTERY, BY COMPOUND SYNTHESIS AND MICRO-ELECTROSCOPY.

AN ABSTRACT OF ORIGINAL RESEARCH.

THE subject-matter about to be communicated in the present and succeeding abstracts is based on a previous essay in *THE ASCLEPIAD* for April 1884, Vol. I., pp. 120-137, entitled, "An Analysis of Animal Structures by Electrical Conduction and Resistance." In that essay some particulars are related of an attempt to determine what parts of the animal body are best and worst conductors, and to ascertain, by that differentiation, whether there are some parts which may be looked upon as special conductors and others as non-conductors. The results are condensed in the following table:—

Conduction of different structures at 98° Fahr. estimated by Hughes' electric balance, on a scale of 200 units from water as a standard.

	UNITS.
Blood-clot, condensed one-third by evaporation of its water	195
Defibrinated blood, condensed one-half	185
Fresh blood-clot	183
Defibrinated fresh blood	180
Defibrinated blood condensed one-fourth by evaporation	
Clear serum of blood	175
Albumen of white of egg uncoagulated	165
The same albumen coagulated	
Under surface of skin	
Pure gelatine dissolved in twice its own weight of distilled water	160

	UNITS.
Blood-clot condensed one-half	158
Pure gelatine dissolved in twice its own weight of distilled water and afterwards solidified by coagulation	145
Fresh pus, sp. gr. 1030	140
Portion of spinal cord, with pia mater surrounding it	137
Brain substance, white and grey, after digestion in ether for removal of fat	135
Grey matter from cerebral convolutions	} 130
Tendon, cut from centre	
Cellular tissue from betwixt skin and muscle	125
Muscular structure of tongue, fresh	115
Periosteum from fresh bone	} 70
Fresh marrow	
Clear white fibrine	53
Fresh dura mater	50
Bone freed of periosteum	} 000
Pure fatty tissue	
Membrane of fat	
Pure gelatine dry	

Since the publication of the above details I have continued research as steadily and industriously as the time at command would permit, delayed, I regret to say, by many interruptions. Enough, however, has, I trust, been done for an abstract worthy of record.

NEW LINES OF RESEARCH.

In this later work two new methods have been devised.

The first consists in combining organic materials with common electrics, such as glass, or with common conductors, such as metallic plates, wires, and rods, so as to build up a compound battery, and, afterwards, by dropping one common agent after another, and substituting an organic agent, to approach towards an animal battery and unravel that puzzle of the natural animal battery which, always before us, is probably as

simple as the simplest instrument that leaves the workshop. To this method I have given the name of *compound synthesis*.

The second method consists in observing under the microscope electrolytic and other changes induced in organic fluids and structures by electrical discharges and currents. To this I have given the name of *micro-electroscopy*.

How these two methods work into research will appear in the course of the abstract.

SEARCH FOR ANIMAL DIELECTRICS.

The previous research had indicated that there are in the body four good non-conducting substances at least—namely, bone divested of periosteum, fat, the membrane of fat, and pure dry gelatine. From this basis of fact I proceeded a little further. I made an attempt to find out if these non-conductors could be made to play the part of dielectrics.

In order to follow out this inquiry, current electricity was for a moment laid aside and statical electricity substituted. A Voss' electrical machine was first used, and was found very convenient; but later on, in the summer of last year, I got Messrs. Mayfield to construct for me one of Wimshurst's remarkable and excellent influence machines, with which I have since almost entirely worked, and which proved of the greatest service so soon as I had acquired the practical skill for keeping it in good and ready order.

Experiments with Animal Fat.

I constructed a plate composed of purified animal fat, derived from an ox that had recently been killed. The fat was melted, clarified, and thrown into a mould, so as to cool down into a solid plate six inches square, and

a quarter of an inch thick. A four-inch square of tin-foil was let into the centre of both surfaces, as in the glass electric plate, and the whole was cooled down to 40° Fahr. The foil on one side was connected with the earth for the negative, while the foil on the other side was brought to the positive of the influence machine, and charged from it. The plate answered perfectly as a dielectric, the foils becoming highly charged.

The plate with its condensing surfaces was next brought in a warm space, until the metal on its surface reached 70° Fahr., when it was charged from the positive as before, but could not be brought up to the same charge, although it yielded a fair spark on discharge.

The same plate with its condensing surfaces was gently heated up until the surface of the foils was 100° Fahr., at which point the process of melting made the surface fluid. Its metal plate on one side was now connected with the earth as before, while the opposite side was charged from the positive conductor of the machine. In this condition shocks could be felt passing through to the negative plate, and no distinctive charge could be retained. Discharges also passed along the surface to the fingers which supported the plate.

The inference I draw from this mode of question—repeated too often with the same answer to permit of any wide error—is, that animal fat brought down by cold to complete solidity is a dielectric, but that raised to the temperature of the living body in which it assumes a semi-liquid state, it becomes a feeble conductor, and loses its dielectric properties. It cannot, therefore, be allowed to rank as a dielectric in a living body, although by its presence, either as interposed between conducting substances or as intermixed with them, it would largely reduce conducting power.

Experiments with Membrane of Fat.

Membrane of fat, carefully removed from between the lobes of fat, from an ox, was cut into a square of four inches and evenly smoothed out. It was lined on each surface with a layer of tinfoil two and a half inches square. It was then tried as a condenser by bringing one tinfoil to the conductor and connecting the other with the earth. The experiment was carried out at 40° Fah., 70°, and 100°, but in no case could approach to a dielectric action be detected in the membrane. The discharge always passed through it as though no resistance whatever interposed.

The membrane of fat cannot, then, I think, be considered as a dielectric; and, as all the other membranes are conductors even to a feeble induction current, it is not certain that we have any dielectric membranes in the body. The membranes must all, probably, be accepted as conductors, presuming, of course, that they behave in the same way before death as they do after death.

Experiments with Bone Structure.

The structure of bone, less periosteum, which, as we have seen, is a non-conductor to current electricity, was tested in various ways. The large hollow bones of the ox, commonly called the marrow bones, were turned into Leyden jars, the marrow having been removed. In another case the marrow was retained, and a metal conductor was pushed down the centre of it, but not so low as to reach the bone. In no case, however, and under no condition, could the smallest charge be retained. The discharge was made direct through the marrow and through the walls of the bone as if through a very fair conducting substance.

Bone in a dry state was next employed. The calvarium of an old but well preserved skull was fitted with tinfoil on its two opposing surfaces, so as to turn it, for the time, into a Leyden jar. It could not be made to retain the slightest charge. It was subjected to dry heat until it was absolutely dry, but it still conducted.

Experiments with Gelatine.

A plate of gelatine was tested in a similar way to fat, membrane, and bone; the plate, an eighth of an inch thick, was smooth and polished. It was heated in dry hot air to complete dryness. It was treated on its surfaces with tinfoil as before, and tested from the machine. It presented no dielectric qualities. The discharges passed from one metallic plate to another without difficulty, and no charge was retained for the briefest interval.

Summary as to Animal Dielectrics.

For the moment it seems to me that there is no proof of a true dielectric in the animal structures. One other structure deserves yet to be tried, namely, the elastic tissue, but there is a difficulty in obtaining that in sufficient quantity to test it. I once transformed a minute portion of it, derived from the aorta of an ox, into a substance like vulcanite, which looks favourable to its being dielectrical. But if it were proved so to be I do not see how the fact would help us in regard to the animal battery.

At the same time, if the animal body, during life, be an animal battery, there must be within it a dielectric which we have not found in the dead tissues. When it is found I suspect it will be either as a finely secreted, easily absorbed fluid, like water absolutely distilled, or as a gas. In

this abstract the narrative of present experiment is all that lies at hand.

ANIMAL CONDUCTORS AS CONDENSERS.

The search for a dielectric with the statical electricity and the mode of mixed or compound synthesis led me to some very curious experiments on condensation, the end of which I do not yet see, so wide a field of research is opened by them. I will indicate the results of one or two.

Experiment upon Blood as a Condenser.

In a Leyden jar, coated *on the outside only* with tinfoil, I placed as an inner coating a layer of dry white blotting paper. I tested the jar and found the results to be the same as when no paper was present in it, the charge being precisely that derivable through the chain rod and ball. I then saturated the blotting paper within the jar with freshly-drawn, mixed, and well-whipped blood, taken at the slaughter-house from a sheep recently killed, for food. So soon as the paper was saturated with blood, the rod and chain were introduced, and the jar was charged from the positive of the influence machine. The charge, at 98° Fah., was as complete as if the jar had been coated inside with foil, and gave an equal spark in discharge.

Experiment with Brain Matter as a Condenser.

From the jar lined on the outside only with tinfoil I removed the blotting paper, and, having cleaned and dried the jar thoroughly, I coated its inner surface with a layer of brain matter derived from the dead sheep, and brought the inner temperature of the jar up to 98° Fahr. I then charged as before, and found almost as equal a condensation as from blood. There was, however, a difference in the character of the discharge. With

blood as the condenser the discharge was the same as from metal—namely, in one long spark. In the case of the brain the discharge was by a number of smaller and less intense sparks, but yet sufficiently intense to give, if they be taken by the knuckle, a smart shock.

Experiment for Charging One Hemisphere of the Brain.

The above experiment was next modified in the following manner. The fresh brain from the head of a sheep was divided completely into its two hemispheres. One hemisphere was placed in the centre of a glass plate, six inches square, the inner surface of the brain resting on the glass. The other hemisphere was placed on the opposite side of the plate in such a manner that the two hemispheres exactly faced each other. This arranged, and the two halves of brain lightly but firmly secured to the surfaces of the glass, I held the glass in such a way that I could touch one hemisphere with my finger, in order to connect with the earth, while I charged the opposite hemisphere from the positive of the influence machine. By this means I charged so completely as to get a severe shock on making contact of the free hand with the half brain that had been receiving from the positive conductor of the machine. I charged and discharged in this way any number of times, sometimes taking the discharge rapidly, at other times taking it in a series of minor shocks extending over several minutes. I also made the discharge do work in producing vibration in a light body suspended between the brain and a rod connected with the earth.

Experiment for Charging the Two Hemispheres.

The experiment was varied once more in another way. Two plates of glass, six inches square, were each

coated in the centre *on one side only* with a piece of tinfoil of the size of the inside surface of the hemispheres of the brain. From the posterior lower edge of the tinfoil there were carried out, so as to extend beyond the glass plates, two lines of tinfoil, which projected as if they were the continuation of the medulla into the spinal cord. The two plates of glass were brought together so that the tinfoils touched and pressed against each other, after which the glasses were fixed firmly in apposition with Prout's glue. The two hemispheres of a sheep's brain were then placed on each side of the double plate of glass, the inner surfaces of the hemispheres facing the tinfoils between the plates. Lastly, the two hemispheres were connected over the plates, in the front, by a band of tinfoil, which passed from one to the other and formed a loop on the front edge of the plates to be presented to the positive conductor of the machine.

I now held the plates in such a way with my left hand as to touch the projecting metals which led from the foils enclosed within the plates, so as to bring those foils into contact with the earth for the negative current; and in this position, I brought the loop of foil connecting the two brain hemispheres to the positive conductor, and charged both from it. The charging was in this way doubled, and yielded a discharge equal to ten square inches of foil on the outer surface of a test jar.

*Experiment for Charging Both Hemispheres, with
Membrane as the Negative Conductor.*

I repeated the last experiment without the tinfoil plates by substituting for them membranous plates of peritoneum, laid between the two glass plates with

similar projecting lines, and affixed to the glass by a layer of blood, so as to moisten the membranes with that fluid. The glass plates, with the membranes in apposition, were brought, as in the previous instance, close together, and fixed with Prout's glue. The plates were held with the left hand, touching the projecting lines from the membranes for the negative charge, while the brain was charged from the positive conductor. The charging was just as perfect as when tinfoil formed the negative.

Summary as to Animal Condensers.

It will be seen from these experiments that by this compound synthesis the conducting and condensing power of every organ admits of being determined. To this observation I would add that every organ which is surrounded by membranes appears to me to possess condensing powers, the power of condensation being determined by the amount of blood with which the organ is supplied. Every vascular organ enveloped in membrane, therefore, may be considered as its own condenser, charging itself, but deriving a *plus* charge from the prime condenser, the nervous system, if requiring it. The membranes on their side play also an essential part as opposing conductors, and as enclosing structures by which extension of condensing surface is almost infinitely increased,—perhaps even to the minutest cellular construction.

ANIMAL ELECTROLYSIS AND MICRO-ELECTROSCOPY.

While the above inquiries were in progress, it occurred to me to ask if floating organic particles, such as blood or milk corpuscles, could be made to exhibit electrical attractions and repulsions by subjecting them to electrical influences. In this inquiry I placed freshly-drawn

blood on the microscope slide, excited the slide by brisk friction on its under surface after it was fixed in the microscope, and meanwhile watched the effect on the corpuscles. In other experiments I brought an excited glass rod, an excited rod of sealing wax, an excited rod of vulcanite, a magnet, near to the corpuscles, and although I repeated these experiments a great number of times, I had none but negative results.

On the evening of October 23rd, in last year, while assisted in one of these researches by my friend, Mr. James Menzies, some new results arose. I placed a drop of fresh blood on the microscope slide in the usual way, and brought it between the poles of the influence machine so that an electric brush passed over the slide, attended with an occasional discharge from one pole to the other. Before the discharges were made, the blood corpuscles were allowed to come to complete rest, and to remain at rest for half an hour. After this the machine was set in motion, when, to my surprise, the whole field of corpuscles passed also into rapid motion, and continued so for two hours and twenty minutes. The motion was not that of attraction or repulsion, but the corpuscles that were in *rouleaux* were either separated or curved in the shape of a semi-circle or horse-shoe. In some parts of the field spaces were formed like lakes, into which the corpuscles streamed at a rapid rate through various canals, and in which the most curious figures and combinations were produced. The next day I repeated the observations on different blood with the same results, letting the blood in one instance remain at rest for an hour, and reproducing the phenomena. The cause of the phenomena was, for nearly a fortnight, a mystery. At last I detected, by frequent repetition, that the phenomena were only

presented when shocks were produced, and, by the exclusive process, I reduced their cause to a vibration of the covering glass by the electrical discharges.

The disappointment which followed upon this disclosure was great, but it was repaid by what followed. I was led to pass electrical discharges through blood under the microscope, and to observe the decomposition of the corpuscles and other parts by the discharges. In this way I observed the most curious modifications in the shape of corpuscles, into comma-shaped particles, zigzags, and trefoils. Sometimes I got beautiful crystals, like chlorides, formed on the plate with fine tubular-like branchings, glandular in appearance, with other striking changes, which must be followed out.

Micro-electroscopy with the Voltaic Current.

After a time still another line of inquiry opened itself, that, namely, of observing the action of the voltaic current, and the electrolysis of blood and other animal fluids under the microscope.

For working in this department I constructed a series of glass cells, mounted on microscope slides, and carrying across them, at the bottom, a thin platinum foil, so arranged that it could be divided with a fine sharp knife into two parts or poles, pointed and separated so far from each other as to leave a quarter of an inch field between the points under a magnifying power of 300 diameters. The outer ends of these platinum points extended to the margin of the microscope slide, so as to render them attachable to the poles of a battery.

When these arrangements were completed, the blood, or other fluid, was placed in the cell covered with a thin glass, and, adjusted to the microscope, was connected

with the battery the power of which was increased gradually until electrolytic decomposition was made visible.

Experiments on Blood as an Electrolytic Fluid.

Freshly-drawn blood, placed in one of the cells above described, and submitted to a voltaic current, presented very interesting changes under the microscope, at a magnifying power of 300. Between the poles the corpuscles disappeared. Gradually, at the positive pole, white lines of coagulated structure were developed, and spread out in a linear network resembling, somewhat, the cellular tissue. With the liberation of gas,—hydrogen,—at the negative pole, bubbles of the gas diffused into the corpuscular substance in various parts of the field forming cavities, around which, in many instances, the corpuscles arranged themselves divided in half, their convex edges applied to the circumference of the cavity and the sharp points of their broken surfaces projecting into the cavity like a pointed fence. These appearances seemed to be connected with the liberation of the insoluble hydrogen, as if the oxygen liberated was absorbed and lost by entering into some new combination.

When iodide of potassium was mingled with blood in a cell the iodine, passing over as usual to the positive pole, coloured the albuminous network, while the potassa that was formed produced a peculiar disintegration of corpuscle. This has opened another research, by which metallic salts, such as salts of lead, become traceable in their course as they undergo electrolysis in the tissues. But here I must ask the reader to wait for a new chapter in a future number.

COTEMPORARY PRACTICE AND LITERATURE.

"Every physician will and ought to make observations from his own experience ; but he will be able to make a better judgment and juster observations by comparing what he reads and what he sees together."—FRIEND.

"VITAL STATISTICS."

(BY WILLIAM FARR, M.D., F.R.S.)

TWAS a happy thought of the Sanitary Institute to determine on publishing, in one goodly volume, the labours of the late William Farr.

Farr was the Ramazzini of modern days, and we may say of him, truly, that he transformed the study of vital statistics from a rude and vulgar art into a true science. The Institute was again most happy in getting into its service such a competent editor of the volume as Mr. Noel Humphrys, for so many years the friend and ever-admiring helper of the master whose lasting works he has here collated.

The volume is made up of 556 pages, with an excellent index ; and it may be said of it, in all truthfulness, that the reader cannot open any page, not excluding the index, without learning something important, if he will lend his mind to the task of careful study. Every subject lighted on, too, is of vital value, and although the word "statistics" is an alarm signal to the majority of readers, so admirably does Farr place his information,

so pleasantly and so easily, that in his case the word need have no terrors.

After a brief biographical sketch of Dr. Farr, the volume proceeds in six divisions, or parts:—1. Population; 2. Marriage; 3. Births; 4. Deaths; 5. Life-tables; 6. Miscellaneous. The volume is a book of reference. As such it will be called for centuries and centuries after the time when we all lie in the same silence as its illustrious author. It is, in fact, a history of the England of the nineteenth century, which no professed historian of the future will venture to ignore, and it is no great prophecy to declare that thousands of social essays will be silently and cleverly constructed from the texts which it affords. Here and there, moreover, a little quiet humour gleams out,—such humour as those of us who knew William Farr best so vividly remember. One instance of this appears in his observations on two “Exceptionally Healthy Districts,” Glendale and Rothbury (p. 149). Respecting a village called Harbottle, in the Rothbury district, he relates from a namesake of mine, Dr. Frank Richardson, “how amongst a community of 120 persons, including 37 children under fourteen years of age, not one child has died during twenty years;” and indicates that the mothers of my Hygeia can scarcely be more successful in rearing their children—their lambs—than the shepherds’ wives of this favoured locality.

Commencing at page 209 will be found the history of the registration of births, deaths, and marriages, which, instituted at the suggestion of Farr, in 1838, and continued still in the Registrar-General’s Returns, has shed such a wonderful light on the social and sanitary life of this great country.

“*THE AMERICAN AND CANADIAN INSANE.*”

(BY D. HACK TUKE, M.D., LL.D.)

HE “*Insane in the United States and Canada*,” is the title of a handsome volume of 260 pages 8vo, from the pen of Dr. Hack Tuke (H. K. Lewis : London, 1885), written in the author’s happiest style. Dr. Tuke has recently visited the United States and Canada, and, as he tells us in his preface, has endeavoured to record, briefly, but he hopes correctly, the impressions received in regard to the conditions of the insane during his tour.

In the first chapter Dr. Tuke describes the early treatment of the insane, medically and morally, in the United States, at the period when Dr. Benjamin Rush was the central figure on the stage of medical practice. Rush, therefore, forms a leading chapter of the work. A life of him, especially in regard to the part which he played in the management of the insane, is supplied, and his portrait, taken from *THE ASCLEPIAD*, with most graceful acknowledgment, is introduced. The second chapter, written in 1876, contains a sketch of the provision made for the care of the insane up to 1876 ; but the hospitals for the insane that have been opened between that year and the present year are added in order to complete the series. The actual state of the American asylums, from the author’s standpoint, is the next topic pursued, and, in continuation, a description is rendered of the individual institutions, with fitting comments.

The most interesting part, perhaps, of Dr. Tuke’s labour is that in which he contrasts and compares American institutions and Canadian institutions for the insane with our own in the United Kingdom. In some particulars his observation is favourable to the

American plans. He approves of the appointment of lady physicians in some of their asylums, although he guards his commendation by scrupulous suggestions as to the care which is required in selecting proper persons for the duty. In female asylums he thinks lady physicians of high standing will be a decided blessing. He considers (page 93), that in the main the Americans feed, house, and warm their patients better than we do, and that individual comforts, likes and dislikes, receive rather more recognition and attention in their hospitals than they do in ours. On the other hand, there is not in America so much employment as there might be, and as, for the most part, is carried out in this country. There is also less attention paid to what may be called decorative comfort; there are, for instance, no such comfortable-looking quarters for the excited class of patients, as are to be seen in our charitable Hospital of Bethlehem, or even in the pauper asylum of Prestwich. Again, the beneficent system of non-restraint of the insane is not so fully carried out by the Americans as by ourselves, although progress is being made in this direction, and the offensive iron gratings to windows, and other signs of harsh confinement, are being removed. On the whole, "the outlook with regard to the future of the insane in the United States is very encouraging."

A most important subject is raised by Dr. Tuke in his third chapter (pp. 66—72), to which all our new legislators ought to turn their attention, namely, the modes adopted in the various States for the admission of patients into the asylum. Every State almost has a system of its own, and the differences are numerous. Our author describes four examples on which the admission is based. (*a*) The Connecticut plan, in which request for admission is signed by a guardian,

relative, or near friend, with one physician's certificate as sufficient. (b) The Pennsylvanian, in which the request of the friend or guardian must be attested by two physicians who have been five years in practice, and who must affirm before a judge or a magistrate. (c) The Massachusetts system, in which an order for admission must be furnished by a judge, certifying that he finds *that the person committed is insane, and fit for treatment in an asylum*. (d) The Illinois system, by which no one is admitted into an asylum without previous trial by jury.

On these systems Dr. Tuke treats with reticent criticism, except on the last or jury system, which seems to be cumbrous, over-public, and bad altogether. He inclines, I think, to the Pennsylvanian plan of the certificate of a judge, and he says nothing very promising about the other methods.

Of the Canadian institutions Dr. Tuke speaks in high commendation, making special reference to the London Asylum in Ontario, over which Dr. Bucke so admirably and successfully presides, and who employs the insane with such effect, that he cures acute mania by making the sufferer from it "break stones."

The number of the insane in the States and in Canada; the influence of emigration on insanity—these, and a host of other topics, enrich the volume, from alpha to omega.

"MATERIA MEDICA AND THERAPEUTICS."

(BY ALFRED BARRY GARROD, M.D., F.R.S.)



HE "*Essentials of Materia Medica and Therapeutics*" by Dr. Garrod (Longmans & Co., 1885) has now reached its eleventh edition, and is published with a new name

added to it, that of Dr. Nestor Tirard, as editor. To all the medical world this book is so well known, and by all is so justly admired, that its merits require little repetition of commendation. A book that has passed through eleven editions, addressed exclusively to so critical an audience as the medical, must be good. It is right, however, to say a word about the newest and latest edition, and that word must be to commend the newest as an admirable continuance of the oldest. Under the head "Materia Medica," forming the first part of the volume, the reader finds a concise and practical description of the whole medicinal armentarium, both for the physician and the surgeon. Under the head "Therapeutics" (second part), he receives, in the same precise form, an account of the physiological action, so far as is yet known, of the various agents which make up the armentarium. This is followed by an appendix, including a brief description of mineral waters; a list of articles employed in chemical testing, and which in the clinical cabinet are always necessary; a list of test solutions, with descriptions as to their preparation and mode of application; a short but very good account of volumetric solutions, with some useful notes of the British, as distinguished from the metric, system of weights and measures; a posological table exhibiting the dose of all important medicines; and, a final table or list, showing the proportions of the more important officinal drugs. To British practitioners everywhere this book is a necessity for daily practical work, and the new Editor is to be sincerely congratulated on the way in which he has presented the work of the master.

"SARDINIA AND ITS RESOURCES."

(BY ROBERT TENNANT.)

 HIS handsome volume (Stanford & Co., London, 1885) is delightful reading to all scholars who enjoy the history of a classical land written upon the spot by one of themselves. The effect of the perusal is, it may be supposed, precisely what the author desired—namely, to excite an inclination on the part of the reader, all but irresistible, to put on his overcoat the moment he has read the last line of the work, and, at all consequences, be off to Sardinia in order to see with his own eyes the wonderful monuments, and lands, and customs, which Mr. Tennant has placed before him in so clear and fascinating a form. To the medical reader there is much to create interest, particularly in regard to climate and salubrity. It appears that in past ages the insalubriousness of the island was matter of proverb. Martial used the word Sardinia as a “synonym for death.” Tacitus, in speaking of the expulsion of the Jews from Rome to Sardinia, says, “that if they should die of the unhealthiness of the climate, it would only be ‘vile damnum.’” Cicero, lampooning the musical buffoon Tigellius, speaks of him as “a man more pestilential than his country.” On the other hand, our Lord Nelson, after fifteen months’ station off the island, credits it with salubrity; and our author gives it, on the whole, a good word, believing that the “intemperie,” or malarious fever,—an irregular ague,—could be removed by proper measures for drawing off the stagnant pools and by better cultivation of land. Mr. Tennant’s book is excellently illustrated, and he who wishes to become familiar with one of the most curious

bits of the planet in its earliest civilised history, but who cannot visit the place personally, should make the visit by this excellent and learned proxy.

“*CHARLES DARWIN.*”

(BY GRANT ALLEN.)

 HIS little work on Darwin is one of the series of “English Worthies” edited by Andrew Lang, and written by Grant Allen (Longmans & Co., London, 1885). It is too soon yet for any man to write an historical life of Charles Darwin, or to make a just comparison between him and his grandsire Erasmus, from whom the now common saying “Darwinism” actually sprang. But, in his usual charming style, Mr. Grant Allen has given just such a life as the writer of this time will read with satisfactory pleasure, and which the writer of a future time will hold to as a library treasure. If some one as near to Newton as Mr. Allen is to Darwin had written such a book on Newton, we know what its value would be to us; and so must we estimate this work. The chapter which, to my mind, is most taking,—perchance, because in a lecture on Darwin to the Sunday Lecture Society, immediately after his death, I ventured to think as the chapter thinks,—is the last, entitled “The Net Result.” In this part the author assumes that if Darwin had never been born, we should have had “not only evolutionism, but also, as Wallace’s discovery testifies, natural selection itself into the bargain. But we should never have had the origin of species.” To make the victory that has been achieved, there was wanted, and there was supplied, “the peculiar idiosyncrasy and

lofty personality of Charles Darwin." To one fresh from his pages, it seems that more will be expected of Mr. Grant Allen than appears in this happy and useful instalment.

"A SIMPLE TEST FOR PURITY OF DRINKING-WATER."

(BY JOHN LOWE, M.D.)

DR. JOHN LOWE has introduced a most simple and effective method of testing the purity of drinking-water. He has succeeded in putting Nestler's test into small glass bulbs, without injuring its delicate but efficient reaction. In testing, one of the little bulbs is dropped into a clean glass, and crushed with a glass rod, or, in the absence of that, a silver spoon. Then a wineglassful of the water to be tested is poured on the test. If ammonia-albuminoid is present, an orange colour is produced, varying in intensity with the amount of sewage in the water. In the household these tests will be of great value, and travellers will have no difficulty in carrying an ample supply of them. The bulbs, filled in vacuo, are hermetically sealed, and preserve the test in all climatic conditions.

January
25th.



1886.



CARDIAC PULMONIC BALANCE.
A CLINICAL STUDY.*

THE motive powers of respiration and circulation, like other motive powers in nature, are derived from the two prime movers or forces, the attraction of the earth, and the force of combustion. The air enters the lungs by the atmospheric pressure ; in other words, by the attraction exerted upon the atmosphere by the earth ; the blood moves and circulates through the vessels of the body by the force of combustion, the evolution of motion from matter during change of condition.

These two forces, these prime movers, always at work in the organism during its life, are each regulated by the specific mechanism of the respirating and the circulating apparatus.

The mind, receiving at first the external phenomena that are presented to it only, is wont to consider that the movements of the chest and of the heart represent the prime forces of life. This is not wonderful, for they seem as if they must be the prime forces. To the untaught in mechanism the movement of the

* Revised from the Author's "Opera Minora" in the *Medical Times and Gazette*, February 2nd, 1867, pp. 110—112.

pendulum of the clock, or the balance wheel of the watch, seems to be the prime movement of the machine. The educated, however, know that the prime force is in the weight or the mainspring, and that what seems to be the force is, after all, the mere regulating movement, the means invented by the maker to prevent the undue liberation of force. But we do not so easily divine—because we do not know so much about the animal machine,—that the respirating and circulating movements are the precise natural counterparts of the regulating movements of the timepiece, and that they themselves, fed by a portion of the force they distribute or superintend, have no more means for generating force than have the parts that are under their governance.

Nevertheless, these facts are so; the movements observed in the chest and in the heart itself are but means to an end, means for the regulation of the prime animal force. Truly by stopping the movements, we can stop the organic motions altogether; but when we stop the pendulum of a clock we, in like manner, bring all the motion of the machine to a standstill.

By the regulating actions of the thorax and heart, nature conserves force, and gives it direction. She strikes a proportion between the amount of blood that shall come to the air surface of the lung, and the amount of air that shall come to the blood surface, in given periods of time. By this arrangement the force itself is regulated at one of its sources, the amount of force liberated in the combustion of blood being determined by the combination of air with blood. The balance thus struck, during normal conditions, is refinedly accurate, the pressure of air and blood being equalised to the nicest degree. On this

fineness of balance the continuity of the delicate lung structures, vesicular and capillary, altogether depends.

The natural formula of this balance may be thus expressed—In a given period of time, say one minute, the right side of the heart must so regulate the blood-pressure that there shall be the same pressure of blood on the capillary surface of the lung as there is pressure of air on the vesicular surface. In like manner, in the same time, the thoracic mechanism must so regulate the air pressure in the vesicles that there shall be the same pressure of air on the vesicular surface as there is pressure of blood on the capillary surface.

The balance thus required is regulated, not so much by the number of cardiac or thoracic movements, as by the force of the movements and their equality. But for this provision every irregularity in the motion of the heart or of the thorax would be registered in the lung by lesion of structure. In the act of running this is well expressed. When a man commences to run the heart invariably takes brief precedence of motion, and the sensation of breathlessness is the result. After a short time, if there be a good balance, the breathing movements come abreast of the cardiac, the breathlessness passes off, and the running is easily sustained until the force of combustion, the mainspring, fails. In short, for true disturbance of the balance on either the respirating or circulating side, there must necessarily be either direct mechanical obstruction or direct failure on one side.

DISTURBED BALANCE FROM MORBID CHANGES.

There are many accidents and many morbid conditions under which this balance, so nicely adjusted,

is disturbed, with lesions of the cardiac pulmonic mechanism as the result. The lesions thus induced are of two kinds, varying simply according to the side on which the disruption of balance first takes place.

When in any case there is sudden obstruction to the column of air passing through the trachea so that the respirating mechanism cannot bring a sufficient volume of air into the lung, the blood pressure remaining the same, there is at once congestion of lung with blood, and, according to the degree of obstruction, stasis of blood in the lung. If the tracheal obstruction be complete and instantaneous the heart, it is true, may be suddenly paralysed, and the congestion may be indifferently marked; but when there is time for continued action of the heart, even for a period of minutes, then there is congestion.

On the other hand, if the balance of power fail on the side of the circulation, the respirating action being continued, then there is undue injection of the lung tissue with air, rupture of vesicles, and emphysema.

Both of these positions admit of being rigorously demonstrated by direct experiment upon the inferior animals. Both are constantly demonstrated in disease of the human subject. Asphyxia by hanging or by the exudation of plastic matter into the trachea or larynx, illustrates the first position; sudden deposition of fibrin in the right cavities of the heart, and gradual failure of the right side of the heart from degeneration of its walls, illustrate the second position.

These are common examples of break in the balance of the two mechanisms, but there are others not less important.

DISTURBED BALANCE FROM ATMOSPHERIC VARIATIONS.

Sudden exposure of the air surface of the lung to extreme cold may, and often does, break the balance on the respirating side. There is contraction of the air-passages, a rapid abstraction of caloric from blood, and a reduced oxidation of blood. On this, if the heart continue active, and the prime force of the circulation remain sufficiently long, there is, during reaction, extreme congestion, exudation, and what is called pneumonia, or congestive bronchitis.

In the opposite way, sudden exposure to heat leads to excessive action of the heart, and to a pressure of circulating blood which the respiration is unable to meet. The oxidation is intense; the venous blood becomes of arterial redness; there is no time for cooling on the respiratory surface, none on the cutaneous. The increment of temperature runs up with fatal rapidity, and the muscles are fixed, from this cause, in tetanic spasm.

I have seen a horse, ridden hard on a hot day, lose breathing power, while the circulation continued in full swing; and, thereupon, with the balance broken on the pulmonic side, pass into as perfect tetanus, as if it had taken strychnine, or had sustained a traumatic injury leading to tetanus.

Changes in the pressure of the air lead to broken balance on the pulmonic side when the pressure is reduced, on the cardiac side when the pressure is increased. The first of these events is witnessed in mountain climbing; the second in the coffer dam, when the workers are subjected to what has been called "caisson disease."

To some extent, and possibly to a greater extent

than is generally recognised, the ordinary variations of atmospheric pressure produce disturbance of the cardiac pulmonic balance. In damp weather, with the pressure low, persons short of breath pant, in order to keep the breathing on a level with the circulation; while in cold dry weather, with the pressure high, those who have feeble circulation have no sufficient power of circulation to sustain a level with the respiration.

In fact, by watching closely the influences of varying atmospheric pressures upon the cardiac pulmonic balance in the unhealthy from thoracic disease, it is not difficult to prognosticate each day from the barometer, thermometer, and hygrometer the general condition of the different classes of the afflicted.

EFFECT OF MENTAL AND PHYSICAL SHOCKS.

Sudden paralysis of the heart, as from mental emotion, severe pain, or physical shock, will break the balance on the circulating side. In cases of that most painful affection, cardiac apnœa, we see this effect of disturbed balance painfully demonstrated. The patient, with the respirating mechanism in full vigour, breathes into almost bloodless lungs with nearly certain disruption of structure more or less extended. In one case of sudden death from this affection, I found the bloodless lungs as white as milk, and so infiltrated with air as to distend the chest walls, and to resist being emptied of air by the firmest pressure of the hands.

Frequently repeated physical shocks lead to a disturbance of the balance which may become permanent in character. A youth was brought to me twenty years ago who had disturbed the balance by violent muscular exercise, and in whom the heart was so powerful and irritable that the least excitement or exertion brought

on an attack of breathlessness. By absolute rest for two years, with the body recumbent, the balance was fairly restored; but to the present day any exertion or excitement, in excess, leads to an attack of dyspnoea, which might easily be mistaken for pulmonic disease having an organic seat in the pulmonary structure, if the original cause were not known.

In the asthmatic, slight causes, acting from either side and disturbing the balance, are often sufficient to provoke an acute asthmatic paroxysm. In these subjects the break leading to a paroxysm is often, perhaps most often, from the cardiac side.

EFFECTS OF VOLATILE FLUIDS.

The balance of the cardiac-pulmonic mechanism may be disturbed by the agency of various substances, vaporous and soluble, some of which we have in common use. I find that all volatile fluids which have a boiling-point as low or lower than the standard temperature of the blood, produce, when they are inhaled, obstruction in the respiratory process, and therewith extreme congestion of the lung, the pressure exerted by the blood current exhibiting a relative excess of power. On the other hand, volatile fluids, having a high boiling-point, say 140° F. or higher, and which produce no effect until they make the round of the circulation, tell first upon the heart, and break the balance on the circulating side. Ether and chloroform, respectively, are perfect representatives of these two classes of volatile fluids.

There are other volatile substances, which producing by their inhalation an immediate action on the nervous expanse, paralyse the heart instantaneously when inhaled in sufficient quantity, and lead to instant pallor

of lung and often to rupture of the vesicles. Nitrite of amyl is a striking substance of this class.

Substances soluble in the blood act differently, according to their primary effect, on the heart or the muscles of respiration. Tobacco paralyses the heart first and breaks the balance on the circulating side. Opium and aconite paralyse the respirating mechanism first and break the balance on the respirating side.

Under alcohol the balance holds with remarkable smoothness after the first stage of intoxication is established. In the first stage the cardiac overaction takes the lead, and the respirating overaction follows. Were it not for this, every attack of alcoholic intoxication would be followed by pulmonic congestion. As it is, this danger is generally escaped, except in very hot and in very cold weather. In hot weather the escape is more difficult, because the heat aids the alcohol in quickening the action of the heart; in cold weather the escape is equally difficult, because under the influence of the cold the pulmonic function is reduced in power. Thus, from heat and cold, under alcohol, we may have similar results, congestion and congestive pneumonia, a fact which my experiments with alcohol under varying conditions of heat and cold singularly and systematically exhibited.

VITAL VALUE OF CORRECT BALANCE.

The balance actually broken is fatal: the balance disturbed, danger to life is imminent. The disturbance being on the circulating side, and the blood being held in partial stasis, the blood-corpuscles begin to coalesce, the lung structure begins to lose its perfect organisation, and even if the cardiac power is restored, these obstacles to recovery offer serious difficulties.

When the balance is disturbed on the respirating side, and the heart is left imperfectly controlled by the air pressure, then there is exudation from the blood into the pulmonary structure, reduced combustion and increasing strain on the thoracic mechanism, with failing prime force to supply it withal. In a word, in the course of disease there is no danger so long as the balance of the respirating and circulating mechanisms is correct; that disturbed, there is danger; that actually broken, there is death.

The failure of artificial respiration, the failure of transfusion of blood in cases where the cardiac-pulmonic balance is actually broken, is due to the perfection of the break. Let the pulmonary artery be left for the briefest time empty of blood, and it cannot then be recharged. The space previously occupied with blood is filled with some gaseous product which prevents the blood passing on from the right ventricle, whatever force be employed short of rupture of the vessel.

POINTS OF PRACTICE.

And now the last and great question comes:—Can an appreciation of the disturbance of this balance, and of the seat of the derangement, be applied, in any case of disease, to the service of practice?

I. I think there are facts to indicate that when we have before us a clear case of disturbed balance from distinct and continuous obstruction to the entrance of air through the larynx, any attempt to relieve by operation—tracheotomy—must, to be successful, be made very early: and that such operation, after long struggling for breath with the lungs congested, their structure infiltrated with fluid, their blood in languid motion, and the respirating muscles exhausted by incessant

labour, is all but hopeless. I do not say this to discourage the operation even under these extreme circumstances, for once I have seen it succeed when, from these conditions, hope seemed gone; but I refer to it in respect to the prognosis connected with it.

II. When in disease there is failure of balance, clearly from the cardiac side; when the heart is failing while the respiration is active, then to do anything that shall reduce the circulation is to break the balance the more completely. On the other hand, when the cardiac action is full and powerful, and the breathing slow and oppressed, the greatest benefit will often follow the removal of cardiac pressure. I still occasionally abstract blood from a vein under these circumstances, and with very decided benefit. My papers on blood-letting as a scientific practice afford more than one example where, with a failing respiration and powerful circulation, the removal of a few ounces of blood has restored equilibrium and saved life.

III. In prescribing remedies which influence, specifically, the circulation, the balance of the cardiac and pulmonic systems should always be remembered.

As experiment teaches us that some volatile fluids having low boiling-points, such as ether, tend to reduce the respiring power, and that some volatile fluids having high boiling-points, such as chloroform, tend to reduce the circulating power, it were worth testing experience from experiment, in extreme cases, to see if these agents can be used, by inhalation, as regulators: ether, in cases where a relatively overpowerful respiration is working with an enfeebled circulation; chloroform, in cases where a relatively overpowerful circulation is working with an impeded respiration.

Lastly, in prescribing soluble remedies, we may, with

advantage, remember their relative values as controllers of the respiring or circulating organs, and select from them according as we may be anxious to regulate the balance between air and blood. In conversing with Dr. Wilks not long since on this point, he made an observation, with which I entirely concur, on the employment of digitalis to control the rapid action of a heart made rapid in its action by the rapidity of the respiration. In lung affection where there is local pulmonary irritation, and where, under the reflex, the breathing is quickened and intensified, the heart may follow suit with a quickness of movement and height of pulse which may convey the idea of vascular overaction. But such overaction is not primary: it is the heart following the respiration at an intense expenditure of cardiac power, a possible forerunner of fatal cardiac exhaustion. In such a case any attempt to bring down the beats of the heart while the breathing remains high, is to check the heart and break the balance on the cardiac side as certainly as if a weight were put on the regulator of a steam engine while the furnace was too keen and the steam-pressure too severe. Subdue the respiration by an opiate or by administration of ether, and the cardiac vehemence will subside of itself.

These and other points of practice suggest themselves when the simple but important study of the pulmonic cardiac balance is under observation. I leave it as a study, which widens greatly when it once takes hold of the observant mind.

THE POVERTY OF WEALTH.



TWO events in my life have suggested the title and subject of this essay.

In 1855, in a printing-office in Great Queen Street, Lincoln's Inn Fields,—No. 37, to be very precise—the cover, in proof, of the first English journal on Sanitation lay before me for revision. In the lower part of the page a picture of Hygeia, the goddess of health, was drawn; and the picture, looking very weird and lonely by itself, wanted a motto. I invented several, but not one to my taste. At last there flashed across my mind;—*National Health is National Wealth*. I fixed on this at once, and in a few days it was the motto of the *Journal of Public Health and Sanitary Review*.

The motto from the first took well with the public, and it was no slight gratification to see it pass, as it soon did, into one of our best-known and most frequently repeated proverbs. I have been led since, nevertheless, to look upon it as an inverted proverb, and to give it an entirely different meaning from that which was passing in my mind when the idea, expressed originally in the five short words, presented itself. How this change came about may best be described in the narrative of another incident.

One day, long after the period named above, I was

entering for professional duty the house, or mansion, of a very wealthy person. It was on the Sunday afternoon of a damp and cheerless London day. On the steps leading to the house there sat a man in the lowest possible stage and state of destitution. He craved of me that I would give him a trifle to enable him to break his fast. He had walked, he said, from Northampton on one meal and no bed. He entered into his many grievances, without any reference to misfortunes or to opportunities. His mind was a scene of complaint against home, country, friends, himself, life. He wanted food; he wanted drink still more urgently; but he did not pity himself nor bemoan his fate. He had come to a point of poverty when he did not care what happened to him. He could not be worse whatever might occur; if the world itself came to an end next minute, it would not "sinnify" to him; it would be rather just the thing most likely to wake him up and give him something to look at that was worth seeing. As that grand event was not likely to occur, the next best luck was a copper or two and direction to the nearest work-house. In both the last particulars I gratified him, and bidding him good-day, saw him slink off without a word of thanks, and without exciting any feeling on my part, that the thanks were either desirable or needful.

I next entered the house at the door of which I had stayed. It was one of those dark, richly-furnished, warm, silent, snug, and tasteless sepulchral mansions in which great wealth so often loves to dwell. The staircases had their steps so thickly carpeted, not a footstep on them could be heard, and through the whole place there was no sound save that of the timepieces on each landing, which ticked away in melancholy measured vibrations, as if they were everlastingly saying,

one after another, "Keep quiet, keep quiet," "Great wealth, great wealth," "Don't laugh, don't laugh."

I entered a big saloon chamber, with that last ticking in my ear, to discover, at the far end, sitting on the window-seat, another man, so entirely like the man I had met on the doorstep, that if there had been time for the transformation I should have felt sure that that man had got into the house before me, had made a slight change of raiment by putting on a rich dressing robe and a pair of furred slippers, and had re-appeared. The expression was the same; the dreary sound of the voice the same. The first exclamation, "What can you do for me?" without a previous word of ceremony or greeting, was all but the same. I was literally startled; I stood before a man so wealthy that the golden calf itself might have called him brother, and I found a repetition of what I had left on the step of his door. Strangely, too, to some, but not to me, I listened to the same story of grievances, to the same views about life and its utter worthlessness; the same absolute recklessness in respect to the future; the same desire, if such it may be called, for some impossible gigantic event to bring a moment's wonder; the same dull, thankless expression for the receipt of an assistance equivalent, in its way, no more, no less, to two poor coppers and a direction to the workhouse.

Then I left, having discovered, as honest John Bunyan says, that there is a bye-way to hell even from the gates of heaven.

From that time I have felt that my original proverb was inverted. In it I treated wealth as the source of health. The mistake was basic. The proverb should be :—

National wealth is national health.

From that time forward, too, I began to conceive the idea, from nature, of the poverty of wealth, which is my text of to-day. I descried that wealth, in the full sordid sense of that term, must lead to poverty, as day leads to night; and that if mankind, struggling at the present in the throes of socialistic revolution, would learn the right way to avoid catastrophe of revolution, it must learn the natural law which reduces extremes of poverty and wealth to synonymous terms and equal qualities, and shun both with equal determination.

The social student will say at once that this is no new conception. It does not pretend to be: there is nothing new under the sun, and never can be, because all that is under the sun is of it, and even the sun itself may not be new.

More than that, it is all epitomised in the Book of Wisdom:—

“There is a sore evil which I have seen under the sun, namely riches kept for the owners thereof, to their hurt.

“But those riches perish by evil travail, and he begetteth a son, and there is nothing in his hand.

“As he came forth of his mother’s womb, naked shall he return, to go as he came, and shall take nothing of his labour, which he may carry away in his hand.

“And this also is a sore evil, that in all points as he came, so shall he go, and what profit hath he that has laboured for the winds?

“All his days also he eateth in darkness, and he hath much sorrow and wrath in his sickness.”

These reasonings, ancient as wise, support sufficiently the truth of the paradox set forth in the words, the poverty of wealth; and I wish now to treat of this.

truth, not as a new subject, but from a different side of an old subject, from what may be called a physician's side, by which it may be argued that health of body and of mind is the only standard of wealth, and that as there can be no health in the lap of poverty nor in the lap of luxury, so wealth is poverty and leads, as in the two cases cited above, to the same results.

Let me, before proceeding further, be explicit as to terms. By wealth I mean great possession, beyond all the possible wants of the possessor, and so much beyond his wants that if he wishes to apply that which he holds as surplus over his own most liberal requirements, he must make a study and labour of the distribution in order to be so much as moderately sure that he is doing good. I do not, therefore, include under the term *wealth* what may be called a fair competency, or such possession as shall place a man and his family above the risk of want. On the contrary, I rather hold with the witty Rochester, that every man should save a competency in order that he may remain honest. Again, by poverty I do not mean frugality, or any simple and inexpensive mode of living, by which a man can live by his own exertions or savings. I cease to include *poverty* until it becomes so extreme that the assistance of others than the poor man himself is called for in order that he may live.

In a word, I define a wealthy man as one above the line of highest competency, and a poor man, or rather a poverty-stricken man, as one below the line of lowest competency. None within those lines concern us now.

With these definitions, I proceed to show, as I feel from natural observation of natural fact, that wealth and poverty are, in effect, the same ; I mean in respect

to the fruits they bear, their practical results on the every-day life, and their influence on the history of a nation such as ours.

I. By the common voice of mankind the word poor is applied under similar circumstances to poverty and wealth alike: we say a *poor creature* when we are speaking of anyone who is out of means or estate. In like manner of a man, however rich he may be, we also speak if he be low in mind or body. We never speak of a rich creature. That man on the doorstep of the house I referred to, and that man in the mansion, were alike poor to the common observation in this sense; they were both *poor creatures*. Their poverty was, moreover, largely of the same kind: poverty of mind and body. So the term is quite correct.

II. Poverty causes poverty. "If thou art poor, thou wilt always be poor; riches are only given to the rich," is one of the old Latin proverbs. The poor man drags down the poor man. To him it becomes certain that, as he cannot live on his own industry, he must live on that of others. From this natural fact springs the further fact, so often commented on, that charity to the poor, misapplied, is an evil rather than a good. From this also springs the equal fact that not to help the helpless poor is heartless. In these matters the reason and sympathy of our common nature come into conflict. Reason says, "The charity is thrown away: the help had better be bestowed on worthier objects." Sympathy says, "Not help the poor creature? why, what then is he to do but steal or starve? for see, he has no capacity for labour." Thus the brain contends with the heart, and the necessary end of the contest varies according as the person in whom it occurs is most potential in brain or in heart; and as sympathy forms

the foundation of all initiative action, poverty by its claims on all above it, and most upon those nearest it, leads to poverty and feeds it. In like manner, wealth makes poverty. The physiological influences at work are precisely the same. Why should poverty labour if it can be sustained without labour? Why should wealth labour when it gets all it wants, and more than it wants, without labour? So springs forth the helplessness of wealth. Why go to the absurd trouble of spending when you have all you want without the trouble? Let the treasure take its own course and accumulate; in that there is the silent pleasure of the accumulation without exertion. Thus wealth, which should cease to be wealth, by being distributed largely for general competency to many, becomes poverty to all whom it does not assist to competency, and to none so much as to those who hold it, and in turn are held by it in hopeless bondage.

III. It is one of the outcomes of poverty to lead its victim to low pursuits, and to wean him from all noble and great objects. There is a poverty so extreme that into the mind of its holder nothing whatever can be instilled that is intellectual or progressive. The brain is too apathetic to receive; the senses are too restless and indolent to focus or concentrate. Whatever, therefore, most pleases, must be something easy and light, such as an animal might take delight in. The lower organisations proclaim themselves dominant. To eat! yes, ravenously; to drink! yes, to any degree; to smoke! yes; to look listlessly over some remarkable sight! yes; to hear or read some story that costs no labour of mind! yes; to repeat the same stories over and over! yes; to find the warmest and cosiest place in which to sleep, and to sleep on as long as possible, without

disturbance! yes. All this is the luxury of life. Poverty of poverties!

But wealth leads to the same poverty: to eat, to drink, to smoke, to revel in inane pleasures; to turn listlessly from one thing to another; to repeat the same old stories and fooleries; to speak in an idle drawl; to sleep in the warmest and cosiest quarters; to indulge in sleep for the longest of possible times, these are the poverties of wealth, in the full exercise of the faculties of poverty.

IV. We are constantly reminded that poverty presses men into dishonesty. It is the fact, and in certain examples of the extremest kind it presses with such pressure that the natural sentiment expressed in the words "Necessity knows no law" overcomes and even vindicates itself against the commandment "Thou shalt not steal." In the poverty of wealth we read, too often, the same indictment. *Crescit amor nummi, quantum ipsa pecunia crescit.* The love of money increases as much as the money itself increases, until positively the wealthiest man may come to the insane conception that he is absolutely penniless. I have known such a person, and have seen in that person every habit and form of penury assumed up to the positive act of theft for supposed necessity. Insanity, some one will say; but relatively poverty is insanity under which to steal is an act of forced insanity, aberration from sane law. But both the insanities, the insanity of the starving pauper and of the grasping millionaire, have the same origin in the mental physical life.

The parallel runs further. By the extreme extension of poverty the right to take without lawful possession becomes an idea which covers the conscientious doubt

that ought to exist as to the taking. Wealth leads to the same moral blindness. This great estate which the wealthy man owns, near other estates loosely guarded, tempts to extension. This fence, or wall, or landmark, is the fence, or wall, or landmark of the great owner. Why should it remain there? In so great an estate a little more added to it will never be recognised, and that unguarded no-man's-land will be better cared for under better protection. Extend, therefore, the fence, the wall, or the landmark. Who shall calculate what theft of wealth, in the very form and pressure and excuse common to poverty, has thus been perpetrated all the world over?

V. I have said that poverty leads to poorness of mental attribute. It leads also to *lowness* of pursuit. The men who live in poverty—and these are my men now—if they must have what is commonly called recreation, seek it in the lowest depths of human activity. To them the forms of sport which are attended with hazard, excitement, cruelty, are the delights of life. They frequent in their miserable way the shooting match for pigeon sport, the race-course, the betting ring, the fancy; and as they cannot go out shooting in accordance with the law, they go out without legal protection, and add the game-keeper, if necessary, to their game-bag. Some, and not a few of them, take to a vagabond life on the sea, get cast off in fashionable foreign watering places, and become the begging outcasts there, reveling in their way in foreign bedevilment.

Wealth follows the same course for its unwholesome recreations. It goes in for sport, for hazard, for the chase, for the betting ring, for the fancy, for the field, for the yachting wandering sea life, for the

foreign loitering and polite vagabondage. The parallel is perfect.

I was visiting a neighbouring country. At the hotel I rested at there was staying, at the time, a rich noble, young, handsome, profuse, animal to the core, animal from head to foot. He had a retinue like himself at his table. In the yard and stables outside he had another retinue, a ragged, jagged, clothes-torn, flesh-torn crew, who waited for their elegant brethren within to come out and play with them. The game they were both at was badger-hunting. The delight of wealth was to follow the wretched badger into the most secret place it could find for protection from the animals that pursued it. The delight of poverty was to get ahead of wealth in the game, and to show its own animal nature as the best and fiercest. I made inquiry, and if I were to tell the whole story of that wealth and that poverty, I should have to tell a history of poverty and wealth stronger in outline than the first history I have related. I should show that the wealth of that rich animal did nothing and went for nothing else but to feed poverty: to make its owner and all under his fatal ban the possessors of that destitution of mind, body, and estate, which is the very acme of the combined evils of poverty in its most degraded caste.

So true is this aspect of the poverty of wealth, in so many and staring forms does it present itself daily for observation, that, if a man of wealth, for any happier reason, devotes his wealth to some useful and noble purpose, he presents so strange and improbable a picture that he is actually glorified for having done a common and commonplace right thing. He can become, in this way, and cheaply, an important and great man,

a benefactor, a munificent patron. How he got the wealth will then never be inquired into too nicely. It may have been by fraud, quackery, gambling, sin of any dye. Never mind. He has applied it usefully. He is a great patron. Marvellous! Marvellous! He has held great wealth and has not squandered it. Oh, the princely virtue!

VI. We know of poverty that it leads men to deficiency of self-respect.

"My poverty and not my will consents," says the poor apothecary.

"I pay thy poverty and not thy will," retorts the tempter, as he throws in the gold.

How true a picture of the poverty of poverty and of wealth; and in this day as true as in the time when the story was enacted or written.

We are certain always, when and wherever a man's poverty is paid and not his will, how bad a bargain and how low a bargain is being struck. Neither receiver nor giver have anything to lose, and so they barter. It is one poor creature helping another poor creature to stagger before the world in an imposing attitude. The mental attributes are in both cases the same to the letter.

I have money, you have skill,
Of my money take your fill.
Of my skill, for your fine gold,
Take as much as you can hold.
Thus they barter, nothing loath,
Till the Devil buys them both.

By which is meant that each of the two high and mighty contracting parties are equally ready to be easily caught in the devil's net.

The most debasing thing of all things human, is, in

fact, poverty selling its soul. No, there is one thing worse, and that is wealth making the purchase. Yet even in the present day, this low and heathenish thing, this barter of the highest gift of man, is one of the common stocks of the marketplace, and one of the commonest causes of abject poverty.

And a further evil in this transfer of soul for money, this barter between poverty and wealth is, that vanity is fed by both. There is a vanity of poverty as of wealth; a pretence on each side, of humility by the poor, of condescension by the rich, which goes to the root of good morals and tears the root up, root and branch. The obsequious bend of body is reflected in the rich man's complaisant nod; the low curtsy is the mother of the great lady's sweet smile. Both sets of acts supply mere food to vanity, and are both wrong, because both are false. In the one there is no real respect, in the other no real feeling, no sweetness; but barter, backwards and forwards. The nod, the sweet smile, are bought as much as the bow and the curtsy; each is the automatic declaration of poverty of body and of soul.

VII. The effect of poverty is to lead to bad training of the young. Why should the young be trained to anything more than their like? Who shall take care of a child that cannot take care of himself? Who shall take up the trouble of parentage when there are public institutions, from the workhouse upwards, ready to do the work? So the young poor of the lowest class are left to their fate: they go their own way, and unless caught by some intermediate hand in their earliest and most impressionable days, and put to useful, honest work, they follow in their parents' career, like breeding like, and the child becoming the father of the man. The

same extends to wealth. After the child of the poorest, there is no object of humanity, as a rule, more neglected than the child of the richest. Thus it has become almost a byeword to look upon the children of the immensely rich as the ne'er-do-weels of the community. We were trying, a short time ago, at a literary table to discover if there were any or many instances of a man enormously rich leaving a child of any mark of character or name. We could find plenty of illustrations on the other side: plenty of instances of poverty of character begotten of riches, but not one solitary example of nobility of nature so begotten. "It is," as the wise man said, "a sore evil; namely, riches kept for the owners thereof to their own hurt. But those riches perish by evil travail: and he begetteth a son, and there is nothing in his hand."

VIII. So far I have traced the poverty of wealth by two parallels of what may be designated the moral side of the question. I reserve to the last the purely physical side, that which relates to failure of mental and bodily health, to disease, and to reduced value of life by poverty and wealth alike.

The mental qualities of the untrained illiterate poor and the untrained illiterate wealthy are so alike, that but for surroundings it were impossible to tell the difference. Each set entertain similar superstitions, fancies, and follies. In sickness they are caught by the same sounds, the same pretensions, the same hopes, the same fears. They require to be directed as to what they shall do, without any exercise of their own judgment or discretion, and they accept the value of professional advice to the letter so long as they have faith in it. But as the trust is on faith alone, it is of little worth, the merest change or caprice having the ten-

dency to upset it altogether. For this reason they are ready in illness to run to any man who, as they have been told, has effected a cure in the same case as their own. The professed and open charlatan lives, in fact, on the very poor and the very rich. I have for some years past presided over a society that has done an immense deal for clearing the moral atmosphere of some of the worst characters of the outrageous charlatan fraternity; and the conclusion I have been obliged to come to, from the direct observation of what I have observed, is that these harpies have no classes of society upon whom they can firmly rely except the two that are most separated—the lowest poor and the leisured wealthy. The poor are the decoys of these persons; the rich are the dupes. This is probably the case in regard to all professions; it is certainly so in regard to that profession which has to treat disease; and what the luxuriously wealthy, as well as the poor, will believe from the charlatan, what they will undergo, surpasses any descriptive teaching I have either time or inclination for setting forth.

The two classes resemble each other in the nature of many diseases from particular causes under which they suffer. We are constantly speaking of the poverty-stricken as an intemperate class. Sometimes we hear them pitied in regard to intemperance, sometimes blamed. "Give them good and comfortable homes," says one man, "and they would not be intemperate." "Take from them the drink," says another, "and the good homes would follow as a matter of course." I do not discuss this question here, because I am treating of results, and the results are, without any doubt, a large mortality, preceded by an unnecessary amount of sickness and pain, from drink as the cause. These poor

resort to drink as a shroud from their misery. "Let us eat and drink, for to-morrow we die."

Amongst the leisured and luxurious rich the same rule obtains so closely that we may, as it were, step over the great intermediate classes, from one class to another, just as in a large hospital we may walk across a corridor from one ward to another. The total of disease from strong drink amongst the wealthy unemployed, appearing under all forms of cunningly devised fables as to its nature and name, would require a volume of no mean size to interpret honestly; a course of lectures, not a sentence or two in one essay. Education, warning, proofs of danger of the most practical kind, seem to have no effect. Quite recently I have had brought before me the very painful picture of four youths, all of highest class in regard to education, killed by wealth, three actually, one morally, all from this cause, and all within a period of six years. Here education utterly failed. But not long since I saw wealth reduce to poverty of death the last of seven members of a family who had received no education. These were competent, frugal, comparatively happy working people, living in sufficiency by the work of their hands. Suddenly they get what is styled a windfall, but which I would rather call a whirlwind fall. They wake one morning to find themselves rich. They must, after the bad fashion of the bad wealthy, signalise the event by a family banquet, with friends invited from all quarters. It must be a grand affair. They must, for the first time in their lives, taste rich wines, costly withal; manufactured champagnes, bearing cabalistic names, made at tenpence a bottle and sold at ten shillings. Now the poverty of wealth begins. "Let us eat and drink, for to-morrow we die." And the

whole proverb is realised to the letter. I have seen that unfortunate family die off from the poverty of intemperance enkindled by wealth, until not one remains of all who laid the table immediately after the whirlwind of their fortune and their mortality.

From poverty and from wealth there occur degenerations of the organs of the body which lead to loss of physical power, feebleness of mental power, ready lassitude, indifference as to external surroundings, carelessness as to the sufferings of others, and sentiments for self which absorb all other. These qualities of mind and body, although looked upon as faults, are really and truly results of organic failures dependent upon degenerative modifications of the vital structures. It is a part of the healthy bodily life that the food, or body-making substance, that is put into it shall produce, or yield, or give out all that is put in, in the form of work done by the body. If sufficient be not supplied, then follows the change or degeneration due to want; if too much be put in, then follows oppression, laying by of matter that cannot be used, and the same kind of enfeeblement as that which springs from want. Between the action of a heart under-nourished and of a heart overburthened, there is practically no distinction of impairment, and so we get similar phenomena from what seem to be opposing causes.

Under both circumstances we obtain shortened life from impaired function. The muscles lose their activity, their willingness to work, their readiness for labour, their powers of endurance. The brain, in like manner, grows dull, and the mind inadequate for duty. Thus arises that misery which marks the face of common poverty, and that melancholy which so often settles in the expression of the wealthy poor. The expression

tells the common story of the unfavourable course of the illnesses from which they suffer. Of all the physical sick, they are amongst the saddest and most helpless. Of all the mentally afflicted, they are amongst the most prone to melancholy.

And from this source of degeneration follows, in certain turn, that failure of heredity upon which the stamina of nations becomes so faulty. The children of wealth, the golden children, as the sycophants to wealth designate them, are, as the children of the poor, the frequent inheritors of the feeblenesses of their progenitors, until at last they fall into the same category and, by the rule of the decadence of the unfittest, speedily join the veritable ranks of the poverty-stricken and sink with them. We have in the world now thousands, perhaps millions, of poor who are by this reason the last remaining links of once great and powerful, because healthy families, whom wealth had not yet blasted, or whose fragments poverty had not yet attracted unto itself. By careful research we might find in every large workhouse in this kingdom the proof direct of this natural law of denudation of wealth. The geologist's eschar or denuded mountain is not a more distinctive, and is certainly not a more common phenomenon.

Perchance the reader, recognising the comparisons and contrasts which I have drawn, will see also the current dangers incident to the extremes of poverty and wealth, and will realise the fact that wealth and poverty in the same sphere are like two electric clouds, safe enough so long as a friendly and sufficiently wide distance separates them, but certain as death to explode in revolution if they too nearly approach to each other. Let the poverty of Eastern

London come too near the wealth of Western London. Let some moral disturbance, some panic respecting supplies of food, some want of work, disturb the equilibrium of wealth, and a mightier consternation than Imperial Rome herself ever witnessed were easily at our doors.*

But some one may fairly exclaim, "Tell us, oh physician of health, what is the remedy. You have laid out the diagnosis, you have detailed the symptoms, you have declared the danger; tell us about the prevention." There is a theory on this subject now very widely spreading, which I cannot endorse. This theory in various guises is covered by the term Socialistic Development, or Socialism. Mr. Fox Bourne, in his late article in the *Gentleman's Magazine*, has most ably explained all the four quarters of this ideal reforming method. He has described the Scientific form of it, the Anarchic, the Christian, and the Æsthetic; and he has laid bare, with almost poetic fervour, the hopes and expectations of multitudes who see in their dreams of the future the millennium of their desires.

There is much in the picture that he has drawn with which I sincerely sympathise; there is much which, in my outline of a model health land, I have myself conceived and proposed. But with the mode of reaching what is yearned for in the socialistic propagandas of all quarters there is presented to my mind that very poverty of wealth which ought of all things to be most avoided. It is as though the propounders of these theories, having their gaze fixed on the poor wealthy creatures, were striving after the self-same

* Since this address was publicly delivered on January 16th, we have had a first taste of this danger in the West End riots.

poor wealthiness, or self-same luxury of indolence. Take, for example, one childish hope. It is made an argument that if labour were equally divided, two hours' labour per day is all that need be thrown on any man, woman, or child; so that out of twenty-four hours, if eight went for sleeping, two for feeding, and two for working, there would be twelve hours left for pleasure, or for such work as should exactly please the owner of the happy time. But this division of time is just about that which the wealthy man obtains, and what is the result? It is not health, it is not strength, it is not happiness; it is *ennui*, despair, poverty of mind, body, and life, in which the mind is no longer a kingdom, but a prisoner in a golden castle.

The error might be pointed out as extending to all the mischiefs personal and general of wealth, to feeding and feasting, to bad sports, to low habits, to indifference, to the whole moral of the practice, "Let us eat and drink, for to-morrow we die."

No! in this craze for happiness by the luxury of wealth I, for my part, see no millennium. I cannot see that we are constructed for any such millennium. As long as we have to live by eating we must live by working: we are as yet too gross to subsist on ethereal nothings, as the angels do. So every violent measure for passing from the poverty of poverty to the poverty of wealth is certain failure.

The reformation, as I venture to argue, is the same as that which Joseph Mazzini applied to the perfection of democracy. It is "an educational problem; it is the eternal problem of human nature," in which the idea of wealthy leisure and miserly rest plays no part whatsoever. The true reforming method

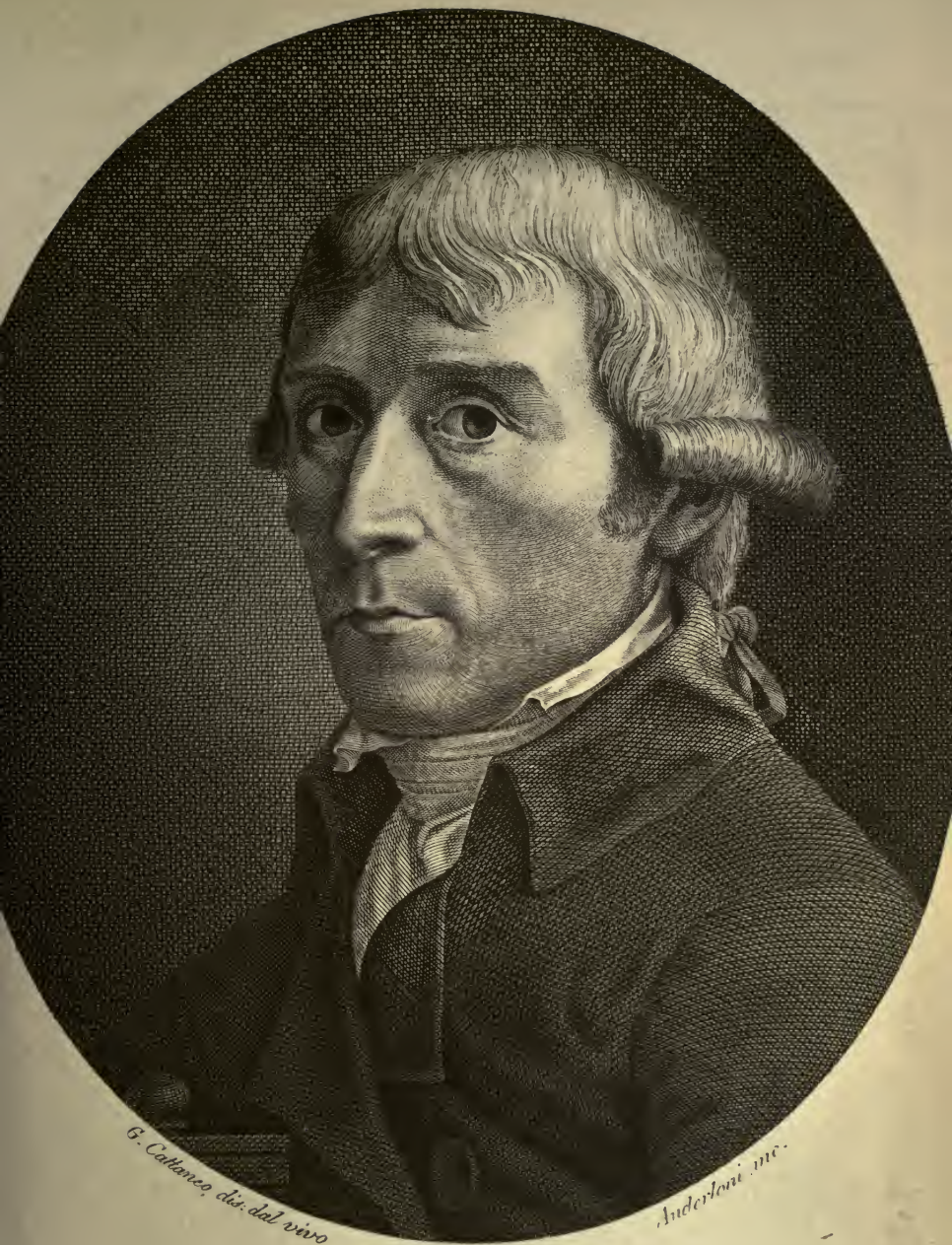
is to instil into the minds of all men and all women the correct relationships of wealth and poverty; to exalt labour as the foundation of health and wealth; to expel the idea of rest on wealth; to teach the emptiness of the fallacy that it is either good or reasonable to provide for generations of unborn idleness; to show that every attempt to base the continuance of family name and fame on worldly possessions, mapped out from the dead earth by so much poor parchment covered with legal hieroglyphics, is the insanity of vanity; above all, to impress on the mind, and on the mind of the young especially, the vital truths; that the family which shall live longest in its units, in its membership, is the family that shall leave the healthiest progeny; and, that the nation which shall live longest is the nation that being healthiest, is by necessity strongest, most active, and nearest to the eternal energy which would itself be dead if the atoms it animates were to fall into repose.

ANTONIO SCARPA, F.R.S., AND SURGICAL
ANATOMY.



OF the followers of Cheselden, and the school of philosophical study which he founded, no one stands out more famously than Antonio Scarpa, known soon to all anatomical students as the man of Scarpa's space or Scarpa's triangle. It is singular how men who leave a name are often signalised and specialised by some one particular word or saying, perhaps rightly belonging to them, perhaps not. Scarpa, because he more clearly than his predecessors described the triangle formed by the sartorius muscle and the adductor longus, and suggested the operation of tying the femoral artery at the apex of the triangle, that is to say, at the point where the sartorius is just crossing the artery, made for himself a name which will never be forgotten while surgery lasts. This was by no means his best, nor his only practical work; but it caught the general ear, and there it remains, an unchallenged and fixed phenomenon. In my early days as a teacher, during an examination in physiology, on the subject of the fluid of the membranous labyrinth of the ear, I asked a student the question:—

Who was Scarpa?



G. Caltaneo, dis. dal vivo

Anderloni inc.

(Scarpa)

And the reply came as fast as it could be spoken, to the amusement of the whole class:—

“The man who invented the triangle.”

A droll answer, but not the one I wished to obtain; for I had been at considerable pains, at the lecture which preceded the examination, in impressing on my listeners the great work which Scarpa had performed in his dissections of the ear, and in explaining that after him the fluid now called endolymph was first called liquor Scarpæ. This had escaped notice; but the triangle, by which the man was known, held its own.

Antonio Scarpa came on the field of life just at the time when Italian science, long the light of the world, had commenced to wane, and just before the victorious armies of the French had entered the Italian states, to ruin them, and itself to culminate and fall with that abortive King of Rome who never mounted the throne. He was a native of the village of Motta, in Austrian Italy; a little place in what is called the department Friuli, lying to the south of the Tyrol; a mountainous district on its own northern border, but sloping to a plain as it approaches the Adriatic Sea, which forms its southern boundary. His parents were very poor. His birth took place in the year 1746, but on what day I can find no satisfactory record. The year of his birth, indeed, is given differently by nearly every biographer, some making it 1748, others 1750. I select the year 1746, because the Duke of Sussex, when recording the death of Scarpa, from the presidential chair of the Royal Society, in 1832, distinctly gives that date, and fixes his death in his eighty-seventh year, in a strictly official and authoritative form.

Entering into the profession of medicine, and choos-

ing anatomy and surgery as his favourite pursuits, Scarpa rose so rapidly in favour and reputation, that at the age of twenty-two he was elected from Padua, in which he had studied, to the professorship of anatomy in the University of Modena. In Modena, the birth-place of Fallopius, and once a city of Etruscan splendour, he had a home which to a mind classical as well as scientific and practical would present many advantages. After a time he left Modena for purposes of travel, and visited Holland, France, and England. Upon his return his reputation was such that, on the instance of the Emperor Joseph II., he was made professor of anatomy at Pavia, which post he retained until near upon the close of his long and brilliant career, in the thirty-third year of the present century.

The election of Scarpa to the chair at Pavia occurred in 1783, in the thirty-seventh year of his age, and soon, by reason of his new and useful labours as anatomist and surgeon, his name became known in all parts where medicine was cultivated.

The position of professor at the University of Pavia was everything that a man of Scarpa's genius, learning, and taste could desire. The University, one of the oldest, some think the oldest in Italy, tracing its origin from Charlemagne himself, had been for many centuries a grand seat of medical learning. In it anatomy, as a scientific study, had found a centre, perhaps *the* centre of the world. There dissections of the human body were carried on without restriction and without superstitious objection; there a museum of anatomy existed; and there students flocked from every State to study under the best masters that could be obtained. Over two thousand students would be at the University of Pavia in Scarpa's day; a majority of these would be in

attendance at his classes; and they, going forth, charged with the light they bore from him, would be the carriers of his name and fame to the nethermost ends of the earth.

Pavia, moreover, was sufficiently large and wealthy to give an eminent practitioner of healing a large and lucrative practice. By its beauty it tempted visitors, and so increased its population. Thus for practice, as well as for professional art, it was a rich field indeed.

To the cultivated mind Pavia presented other treasures. A noble history attached to the place, with a surrounding scenery and a climate that fostered the best faculties of mind and body. To crown all, the professor of anatomy had in his University professional colleagues emulous like himself to stand in the first rank in their departments. Volta was one of these noble and immortal compeers.

Altogether a fortunate start in life was the professorship at Pavia for Antonio Scarpa. Add to this, on his own part, a healthy if not a wealthy parentage, a constitution bearing a charter of excellent health, good for fifty years, and who shall say that our anatomical surgeon was not a fortunate man?

In the case of such a man as this the poor biographer is to be pitied, rather than the biographified. The biographer finds no events for the interest of his readers. They, with him, can see their hero, or the one whom they and he would call their hero, going day after day for year after year his regular round of labour. The lecture in the early part of the day; the demonstration in the museum or dissecting room; the routine of visits to the sick; the clinique at the hospital; the surgical performance in the operating theatre; the night spent in the library, transferring the work of the

day into literature intended to flow on when its author lay at rest; the studies with the artist, engraver, and printer; the occasional free evenings, when the hours would pass in the society of friends, fellow-professors, advanced students; hours when the hospitalities would have full play, and the feasts of soul, for which Italy was ever immortal, would have their swing. These scenes, told and retold, will occur to all without further promptings. There let them stand, in pleasant fancy and repose, while more serious descriptions fall from the pen.

SCARPARIAN LABOURS.

The life of Scarpa is eventful only through his labours. He is from the beginning to the end of his career the professor; his genius, observation; his force, industry; his fame, purity;—purity in exactitude, patience, exposition, initiative, direction. Let us, then, in these works find our next advance in reading the life that lies before us.

On the Nerves of Sense.

Some researches on the nerves of hearing and smelling, "*Anatomicæ Disquisitiones de Auditu et Olfactu*," Pavia, 1789, formed the first work of Scarpa which brought him into fame. This work was considered by his cotemporaries as remarkable for the precision with which the descriptions were rendered, and it remained for a long time the standard on the subjects upon which it treated. It is still looked upon as a classical treatise by the curious in science.

Later on Scarpa gave to the world another treatise on the ear, entitled "*De Structura Fenestræ Rotundæ, et de Tympano Secundario*." In this memoir he describes the membrane attached to the orifice of the

fenestra rotunda, under the name of the second tympanum. He also describes the aqua labyrinthi, giving an account of the fluid of the labyrinth with so much care, that it took his name in many after-essays, by other anatomists, as the "Liquor Scarpæ."

On the Nerves of the Heart.

A few years later he issued a new work on the nerves of the heart, under the title, "*Tabulæ Neurologicæ ad illustrandam Historiam Cardiacorum Nervorum.*" Pavia, 1794. The treatise is the first in which the nerves of the heart itself were properly delineated. Other anatomists had already shown that the bloodvessels of the heart are accompanied by nerves; but to Scarpa is due the discovery that the muscular structure is also supplied with nerves. Sæmmering had taught that the nerves of the heart were smaller than those of any other organ of the body. Behrens had held that the nerves were destined for the bloodvessels only. Scarpa showed, from his dissections, that the nerves were of the same size and character as those of other muscular organs. The plates accompanying the text are masterpieces, and deserve the compliment paid them by our own critical Bostock, who says of them that they "may be considered among the best anatomical plates that were ever published. They are admirably expressive of the subject, without the gaudiness of the French engravers, who appear to aim principally at effect; or the tameness of the English, who seem to think of little else except economy."

The praise thus bestowed on these plates is not one word too strong. They were before me the day before I wrote of them here, and any art of the kind more thoroughly perfect I have never seen. Bostock, always

judicious and discriminating, is precise in what he says. There is no gaudiness, no false economy, but there is just what is wanted, nature,—the natural outline, shadow, structure. I would recommend every writer who is about to illustrate a work on anatomy or physiology to take a lesson from Scarpa as a preliminary task. Albinus is often admirable, but Scarpa excels Albinus in artistic feeling and descriptive fidelity. The distribution of the nervous filaments, the ganglionic enlargements, the main trunks of the nerves, rendered from dissections most refined in their minuteness and neatness, conveys a much more extensive nervous mechanism than is, I think, commonly assumed as belonging to the heart.

In respect to the influence of the nerves of the heart on the motion of that organ, Scarpa was of opinion that the influence was largely independent of the brain, adducing in support of that view the case of acephalous monsters, in whom the cardiac function may still be actively performed.

On Structure of Bone.

In 1799 Scarpa published a memoir on the structure of bone under the title, “*Commentarius de Penitiori Ossium Structura*,” Leipsic, 1799. The work here named is an exposition of the cellular structure of bone, with some notes on the growth of bones, and on some diseased conditions of bones. The author ventures, also, in this opusculum to speculate on certain points in the chemistry of bone, and on the influence of chemical reagents; but the leading feature of his argument is that the membranous part of bone is not made up of concentric laminae,—a view which we, in this day, should hardly support. The work was trans-

lated into French by M. Lèveillé, with an additional essay by Scarpa himself, on the causes and treatment of club foot.

On Aneurism.

Another classical and famous work of the surgical-anatomical order was on the subject of aneurism. It was written in Italian, under the title, “*Riflessioni ed Osservazione anatomico-chirurgiche sull’ Aneurisma,*” Pavia, 1804. The labour was undertaken on the occasion of a question on the subject proposed by the Society of Medicine of Paris in the year 1798. The work is based on the anatomy of aneurism, including a faithful account, in so far as the knowledge of the time permitted, of the structure of aneurismal tumours. The nature of the disease is supplemented by a description of the surgical treatment and of the operations that are required for cure.

On Ligature of the Principal Arteries.

Many years after the publication of the “*Treatise on Aneurism,*” Scarpa issued a memoir on ligature of the principal arteries: “*Memoria sulla Ligatura delle Principale Arterie.*” In this memoir, following the experience of one of our own countrymen, Jones, and backing it up by his own experience, he renounced the mode of operation in which the artery is completely closed by the ligature, and substituted the plan of compressing the vessel with the ligature less completely for three or four days only, and after the pressure has excited sufficient inflammation to produce closure of the vessel, of removing the ligature altogether. The mode of carrying out this removal he described in 1823 in a letter, with one plate, addressed to Dr.

Omodei, on temporary ligature of the great arteries. "Sulla Ligatura Temporaria delle Grosse Arterie degli Arti," Milan, 1823.

On Hernia.

In 1809-10 Scarpa brought forth a treatise on Hernia, "Sull' Ernie Memorie Anatomico-chirurgiche," Milan, 1809-10. This treatise, essentially of a practical kind, although, as usual, illustrated anatomically, passed through many editions, and was translated into the French and other tongues. The work continued to hold its own for many years, and was republished, revised from its previous editions, in Paris, in 1823, turned into French by M. Ollivier.

On Perinæal Hernia.

As a supplement to the edition of the work on hernia edited by Ollivier, but published, likewise, in a separate form, was an essay on perinæal hernia, "Sull' Ernie del Perineo." In some respects this essay was a novelty in surgery. The statement that there might be hernia through the perinæum had been made before Scarpa's time, but had not been generally accepted. Dessault had denied it altogether, and Astley Cooper, while conceding that a portion of intestine might be pushed down very low in the pelvis, so as to rest on the perinæum, would not admit that it could ever protrude there so as to form a true hernial tumour *in perineo*. Scarpa settled this controversy by showing, from direct observation, that Chardenon, the first surgeon who had described the rare phenomenon, was correct. Scarpa had for some years under his care a patient who suffered from a reducible hernia in the perinæum, for which hernia he devised a truss that answered well. The

patient, ultimately died from phthisis pulmonalis, and our anatomist seized the opportunity of a *post mortem* to inquire into the nature of the hernial sac. His dissections, carried out with extreme care, and illustrated by five engravings, proved that there may be a hernia of the intestine to which the term perinæal hernia is rightfully and scientifically applicable.

Diseases of the Eyes.

Between the years 1801 and 1816 Scarpa presented six editions of a treatise on diseases of the eyes. The original title was "Saggio di Osservazioni ed Esperienze sulle Principali Malattie degli Occhi." Pavia, 1801-16. In 1806 this work was translated into English by a surgeon named James Briggs, a member of the College of Surgeons, and assistant-surgeon to the Public Dispensary, and was published by Cadell and Davies, of the Strand. Briggs, who lived in the Edgware Road, London, seems to have had a good knowledge of the Italian tongue, and to have been on terms of friendly communication with Scarpa. He was also a friend of one of our own very eminent but now forgotten London surgeons, John Pearson, F.R.S., the Junior Surgeon of the Lock Hospital, and of the Institution for the Investigation of Cancer; an observer of great power, and an original thinker. To Pearson the translation was dedicated by the translator. The volume consists of 536 pages, and contains three sets of plates, the last series of much interest, as showing the instruments used by Scarpa in his ophthalmic operations.

The preface to this book by the author is boldly singular in vindicating that the surgery of the eye belongs to the domain of general surgery, and is no mere section of surgery. "Professed oculists," he

says, "who have entirely devoted themselves to this department, and from whom great and important improvements might justly have been expected, have only contributed new theories, which, for the most part, have been disproved by a minute anatomical investigation of the eye, or have merely furnished histories of cures little less than miraculous."

In the practical portions of this work Scarpa revived the old operation for cataract by *depression*, as opposed to *extraction*, of the crystalline lens; not only because depression is more easily executed than extraction, and can be equally employed in every species of cataract, whether crystalline or membranous, solid or fluid; but because depression is attended with symptoms far less violent and dangerous than those which frequently happen after extraction; and because, if from any accident this operation should occasionally prove unsuccessful, it may be repeated two or three times upon the same eye without any risk; a circumstance which *extraction* does not admit of when that operation has not had the desired success.

The instructions for the operation of depression are few and simple. For hard cataract the operator is to push the lens well under the vitreous humour, taking great care to dispose also of the capsule that there may be no formation of "secondary membranous cataract." If the cataract prove to be of the milky character, the surgeon is not to lose his presence of mind at seeing a whitish milky fluid issue from the capsule, diffuse into and through both chambers of the aqueous humour, and obscure the pupil and the whole of the eye; but he must make sure of breaking up the capsule in order to avoid membranous cataract. The milky fluid will, he may be sure, all be absorbed in a few days, spon-

taneously, and permit the pupil and the whole of the eye to resume their natural brightness. If the cataract turn out to be soft or cheesy, the capsule is to be thoroughly lacerated, and the cheesy molecules, well broken up, are to be thrust with the needle through the pupil into the aqueous chamber, in order that they may not be carried opposite the pupil, but being situated at the bottom of the anterior chamber, may be gradually dissolved and absorbed without obstructing the sight.

In another chapter Scarpa describes a new method which he invented for making an artificial pupil when that is required. He gives to Cheselden the credit of first suggesting and practising the operation for artificial pupil, while he claims for himself a useful modification of the method, which consists in separating the outer edge of the iris from the ciliary ligament for a certain extent without previously dividing the cornea. The details of the operation are supplied with such minuteness, that to read the account is almost to see the operation performed. On the whole, it seems to have turned out a successful procedure.

Another chapter is devoted to the treatment of dropsy of the eyeball, and is well worth perusal. In the early stages of dropsy he has, he tells us, sometimes succeeded in quieting the uneasy sense of distention by a seton in the neck, but as soon as the eyeball begins to protrude from the orbit, there is nothing to prevent the extension of the disease except an operation, "which consists in evacuating the superabundant humours of the eye, by means of an incision, and thereby obliging its membranes, in consequence of a mild inflammation and suppuration of the internal parts of the eye, to contract of themselves and retire to the bottom of the orbit."

The operation proposed and practised by Scarpa for the relief of dropsy of the eyeball consisted in piercing the cornea, with the small knife, a line and a half from its summit or centre, in passing the instrument from one canthus of the eye to the other and dividing the cornea downwards in the form of a semicircle, in raising this segment with the forceps, and, turning the cutting edge of the knife upwards, completing the operation by removing a circular portion of the centre of the cornea, of the size of a large lentil seed, or three lines in diameter in the case of an adult. Through this opening, with gentle pressure, he forced out so much of the superabundant fluids, as to allow the diminished eyeball to re-enter the orbit, and be covered by the eyelids. The remaining fluids were allowed to escape of themselves, and the inflammation and suppuration that followed caused such destruction, with ultimate contraction of the eyeball, as to allow an artificial eye to be worn easily.

The volume closes with the record of a case of calculous concretion of the internal part of the eye.

On Scirrhus and Cancer.

A memoir on scirrhus and cancer, by the industrious Italian professor, under the title, “*Memoria sullo Scirro e sul Cancro,*” in the *Transactions of the Imperial Institute of Milan*, 1822, maintained in a signal degree his grand reputation. This memoir seems to have met with a hearty reception in England, owing to a literal translation of it, also by Mr. James Briggs. As the arguments advanced in this essay refer to many points which are still under discussion in our learned societies, I shall bestow on it a little extra attention.

Scarpa, then, advocates, in the treatise now before

us, the view of the local origin of cancer, and from this view tenders the opinion that it is vain to expect to find a specific remedy for scirrhus, and as vain to entertain an expectation of the restitution of a cancerous structure, as it would be of an encysted tumour, or an opaque crystalline lens. The science of treatment in cases of cancer turns, therefore, on the answer to one decisive practical question:—What is the precise period when the diseased structure may be removed with the best chances or assurances of success?

Another point which he insists on is that cancer is never formed except from legitimate scirrhus affecting some of the external conglomerate glands, or from warts or malignant tubercles of the reflected skin, partaking of the nature of scirrhus. He holds that cancer is, exclusively, a cutaneous disease: it never primarily affects the lymphatic system, nor the absorbent glands, nor the mucous glands, nor the viscera, except in those internal parts which possess an extension or reflection from the skin direct in kind, as the pharynx, the esophagus, the stomach, the rectum, the vagina, and the cervix of the uterus. Even in respect to uterine cancer he affirms that it never occurs except from the ulceration of small scirrhus masses or elevations which are formed upon the reflection of skin investing the upper part of the vagina and the cervix. In all the records of surgery he declares there is no well-authenticated case of cancer of the uterus arising from any other part of the uterine surface or uterine structure.

What we now call medullary cancer, and other forms of the disease affecting visceral organs, Scarpa would not admit to be cancer at all in his sense of the term. To his mind hardness of structure is, as the name im-

plies, the distinguishing sign of scirrhus or true cancer, which he defines as a disease of advanced or middle age in persons of a bilious, sanguine temperament,—in whom there is no scrofula; and which he describes, diagnostically, as a growth excessively hard and indolent, increasing slowly in every direction, and retaining its insensibility until it degenerates absolutely into cancer. These characters distinguish scirrhus from scrofulous tumours, from swellings of conglomerate glands, and from medullary tumours, which have their origin in subcutaneous or intermuscular textures.

Scarpa denies that any hard chronic or indolent swelling may from lapse of time change into cancer. Cancer is local, but it is also specific, in the sense that it must be founded on a predisposition. At the same time he questions the existence of a scirrhus diathesis, for two reasons: firstly, that scirrhus is an isolated disease; secondly, that if a scirrhus tumour be removed before it has degenerated into cancer, it is radically cured. This idea of predisposition to the disease, minus diathesis, may seem a paradox; and, indeed, it has been raised against Scarpa as a writer that he was given to paradox. I do not, however, think that the charge would in this instance be fair; for, as he puts it, there is between predisposition and diathesis a difference which admits of application far beyond the range of cancer, and extending into the range of all disease. The idea is, in short, one of those flashes which no one but one who has the eye of genius suggests, and which, like a passage from a Dante or a Shakespeare, is penned by a man unconscious of his own inspiration.

There is always, if I read the Scarparian idea correctly, predisposition to cancer in those whom it attacks;

but the predisposition may be due to internal elaboration from and in the individual himself. The disease is the deposition of a centre or seed of a more formidable character than the scirrhus itself. This is by virtue of the predisposition, which may have descended from ancestry, but which may also have developed in the person affected. The centre laid, the exciting cause alone is required to bring out the malady. But the exciting cause is no more than *occasional*; it may be suppression of the menstrual flux in women, of hæmorrhoidal flux in men; it may be external violence; deep and long-continued grief; the abuse of venery or such-like,—a cause, in short, which may affect anyone, but which will not bring forth cancer except in the predisposed. Thus, the *efficient* cause of the disease is to be traced to no other source than that of natural elaboration to which every individual is, more or less, or in no measure, predisposed, although exposed to the same occasional exciting causes.*

Summing up the diagnosis of scirrhus, Scarpa defines the glandular form as :—a disease of advanced or middle age, attacking most frequently the bilious-sanguine; a solitary affection; excessively hard and indolent; insensible, notwithstanding its increase in size, until it degenerates into the second or latent stage of cancer, attended with pruritus, a sense of burning heat, and darting pains, not increased by pressure. Scirrhus

* The above, as far as I have been able to follow him, is a fair representation of the mind of Scarpa, on the development of scirrhus. I would, however, that some English scholar and surgeon, a master of all the refinements of the Italian language, and possessing also a matured experience of the disease in question, should reproduce this remarkable memoir, with fitting comments, in an English dress. A man pre-eminently fitted for this task is my learned friend Joseph Sampson Gamgee.

warts and tubercles are, he says, to be judged of from their universal rigidity and hardness; from their being deprived of their natural integument; from the size and depth of their base; from their yellowish livid or dark colour, surrounded by a red circle; from their rapid and almost sudden growth; from the intolerable pruritus excited by them; and from the fissures which are formed in them, from which there is occasional slight discharge of yellowish acrid serum, preceded by darting pains.

Of treatment Scarpa speaks authoritatively from experience, and briefly from decision based on knowledge. What he inculcates is summed up in five words, in respect to glandular scirrhus: *Operate in the first stage*. In his long practice he only succeeded three times after extirpation in genuine scirrhus, and those were cases in which he was so fortunate as to operate before the occurrence of pruritus, heat, and lanciolating pain. In respect to warts and minor growths on the skin, he would give more liberty as to period of operation, but with them delay is also dangerous.

Minor Works.

In addition to the larger works named above, Scarpa contributed many minor essays: "On the Cutting Gorget of Hawkins, and Remarks on the Lateral Operation for Stone," translated by Briggs, 1816. "On the Anatomy and Pathology of the Bones," 1827. "On Hydrocele of the Spermatic Cord," Pavia, 1823. "Observations on Recto-vesical Cutting for the Extraction of Stone from the Urinary Bladder," Pavia, 1823. Letter to the Cavalier Luigi Bossi "On a Helmet of Iron Exquisitely Engraved," Pavia, 1816: with other artistic and literary letters and memoirs.

THE SCHOLAR AND MAN OF FAME.

We have seen Scarpa so far as the Professor, the Surgeon, and the Author. Let us, for a few moments, turn to him as the scholar and man of fame.

The fine portrait of Scarpa which accompanies this number, and which is from the life, tells us, beyond any verbal description, the character of the man. A man of spare build and powerful frame, lithe, active, enduring, with a face of resolve, determination in every feature. The lips firm set, compressed, resolute; the nose well-formed and strongly set; the eyes like those of an eagle, microscopic, telescopic, from which nothing in the range of unaided vision could escape; a head of the keen perceptive build. A face and expression like that of our Horatio Nelson, who, had it fallen to him to be professor of anatomy at Pavia instead of victor of Trafalgar, had been a Scarpa.

It were difficult to imagine any sick person doubting Scarpa. Look at him and live, or die. His very portrait, to this day, speaks.* Doubt me if you dare. The full determination of this man in all he undertook; the resolve to persevere in what he had begun, without the intervention of any timid faculty of reason, when reason is past being useful, seem ever to have been present in him, as a single incident will show.

He was operating one day for cataract in the practical school of Pavia, and in the presence of a goodly number of students, when an untoward accident occurred. The straight needle, with which he was effecting the depression of the cataract, being made of bad tempered

* For the portrait I am indebted to my good friend Mr. George Brown. Endow it with compassion in place of sternness, remove the peruke, and it might pass for the portrait of our greatest living surgeon.

steel, bent into the form of a *small hook* as it was piercing a very firm sclerotic coat. This he perceived as soon as the instrument appeared between the pupil and the capsule of the crystalline lens. Instead of being perplexed, however, he proceeded with the operation, and having pushed the point of the small hook through the capsule into the fine substance of the lens, he removed both from the axis of vision with the greatest facility, and afterwards withdrew the needle from the eyeball without producing any laceration. From the accident, thus coolly met, he gathered an experience. He considered that the curve or hook in the needle was an advantage, and from that time used for depression a curved instead of a straight needle.

He was happy, owing to this keenness of perception, in seeing what at first were minor, but afterwards became major points of practice. The description of the anatomical triangle, which bears his name, and of the ligature of the femoral at the apex of that triangle, was one of those little great advances which distinguish men of his class. Some French writers give to their distinguished surgeon Anel the credit of first tying the femoral artery for the cure of popliteal aneurism; some English writers give the credit to John Hunter; but the common consent is to give the credit to Scarpa, not because he deserves it, for it belongs to Anel, but because he defined a point for the operation, from which the *magister chirurgiæ* cannot easily err.

As the name of Scarpa became widely known, honours flowed in upon him from all quarters. He was elected a member of the Royal Institute of Literature, Science, and Art, of the Lombardo-Venetian Kingdom; a Foreign Associate of the Academy of Sciences of Paris; a Chevalier of the Legion of Honour; a Chevalier of the

Imperial Order of Leopold; and, a Fellow, on the foreign list, of the Royal Society, elected on the 5th of May, 1791, the President, Sir Joseph Banks, in the chair. The minute of election runs as follows:—

“This being the meeting appointed by the statutes for filling up the vacancies in the foreign list, and the number of the candidates being equal to that of the vacancies, the following were, without any previous selection, put to the ballot, viz., M. de la Grange, Member of the Royal Academies of Sciences of Paris, Berlin, &c.; Signor Alessandro Volta, Professor of Experimental Philosophy in the University of Pavia; Antonio Scarpa, Professor of Anatomy in the same University; Marc Augustus Pictet, Professor of Natural Philosophy at Geneva; M. de Lambre, of Paris; and M. L’Huitier, of Geneva. They were all chosen Fellows of the Society on the Foreign List.”

THE LAST CHAPTER.

Up to his sixty-sixth year, Scarpa continued to hold the chair of anatomy at Pavia. Then, his health beginning to decline from age and work, he retired from the professorship, to take the honourable, yet still responsible post, of Rector of the Medical Faculty of Pavia. He held this post with great distinction. He was sufficiently wealthy to retire from active professional labour, to live in comparative splendour, and to hold himself at liberty to follow his likings for the study of agriculture, collection of works of art, and cultivation of the friendships of the chosen spirits that were nearest to him in taste, disposition, and culture.

In his last years, he who helped to restore so many to sight temporarily lost, himself became blind, and on October 30th, 1832, during an attack of inflammation

of the bladder, at Pavia, he went his way, *ad divinum animorum concilium cœtumque*.

The death of Scarpa was most delicately noticed by the Duke of Sussex, as President of the Royal Society, on November 30th, 1832. He said that of foreign members the society had to record the deaths of Cuvier and Chaptal in France, of the Baron de Zach in Germany, and of Oriani and Scarpa in Italy. To Scarpa the Duke paid a warm tribute.

“Antonio Scarpa, one of the eight foreign members of the Académie des Sciences of Paris, and probably the most profound anatomist of the present age, was born in the year 1746, and died in October last in his eighty-seventh year. He was made professor of anatomy in the twenty-second year of his age, and for the last half-century he has been placed by the common consent of his countrymen at the head of their anatomists and surgeons. He was the author of magnificent and classical works on the organs of hearing and smell, on the nerves, on the principal diseases of the eye, on aneurism, on hernia, with memoirs on many other subjects of physiology and practical surgery. He had accumulated a handsome fortune by the practice of his profession, and had collected in his palace at Pavia a considerable number of works of art, where he lived for the latter years of his life surrounded by his pupils, revered by his countrymen, and in the enjoyment and contemplation of that brilliant reputation, the full development of which a great man can rarely live to witness.”

A truly princely epitaph from a prince amongst men to a prince of the Divine Art.

OPUSCULA PRACTICA.

“There are mites in science as well as in charity.”

BENJAMIN RUSH.

ON TAPPING FOR ASCITES.

THE question has often been discussed whether in ascites it is good practice to tap so soon as the fluid has caused a decided distention, or whether it is better to wait until, by the accumulation of the fluid, the abdominal and thoracic organs have come under pressure. In my student hospital days I was taught to define two classes of cases, in one of which it was good practice to operate at once, while in the other it was not good practice until there were signs of visceral displacement. The cases in which early tapping was supposed to be good were those in which the accumulation of fluid is very slow, without any distinctive evidence of cirrhosis of the liver, of valvular obstruction of the heart, of any pre-inflammatory visceral mischief, or of albumen in the urine. The second class of cases, in which it was held to be necessary to wait for pressure on visceral organs before tapping, were such as present symptoms either of cirrhosis, valvular obstruction, pre-inflammation, or albuminuria; because it was assumed that, in these instances, tapping will be followed by quick re-accumulation, that the operation will have repeatedly to be carried out, at short intervals

of time, and that, from the shock of the operation, and its necessary quick repetition, no advantage is gained in the long run.

In regard to the first class of cases the practice of early operation remains, I believe, acceptable, generally, in the profession. I for one have followed it without exception, and with results which admit of being recalled with every satisfaction. In a case where I met my friend, Mr. Hemming, in consultation, we tapped a lady who was over eighty years of age; and after that Mr. Hemming repeated the operation every three or four months for nine successive times, with the best results. In a case I have now under observation, a patient whom I have twice tapped, is certainly in better health at this time than he was twelve months ago. I could multiply these particular experiences, but I pass to consider the cases of a more acute nature, where early tapping is condemned, in order to express, with all respect, the opinion, that even in these examples it is best not to defer operation until there is visceral displacement. *A priori* it must be very bad practice to subject to pressure and displacement the visceral organs of persons in whom the elastic tissue has from age become impaired. Such organs, once compressed and displaced, can never fully regain their natural position and function even when the pressure is taken off them. The question, then, is whether it is best to remove the fluid when the organs are unencumbered, or to let them run into certain embarrassment. The organs concerned are the kidneys, the stomach, the liver, the heart, the lungs, and—by the pressure on the abdominal veins—the spinal column and brain through the cerebro-spinal fluid, as I have shown in a previous essay. Can it, in any case, be good to let these vital

organs be thrown out of proper work on the chance that an operation may have to be performed more than once? The danger attendant on the operation, if the operation be performed leisurely, and with a small trocar, is, according to my experience, *nil*, and with ether spray as a local anæsthetic, painless. So there is left only the risk of repetition. Is that, under the circumstances of certain continuous accumulation, to be considered a risk? Balancing everything, I consider it no risk that ought to be evaded, and for several years past now I have accepted it with results beyond my expectation. In one instance, in a hard drinker, in whom there was evidence of hepatic obstruction, and who took to total abstinence when it was thought to be too late, an early tapping in which nine pints of fluid were drawn off, was followed, under continued abstinence, with such good results, that no repetition of the operation has been called for, although four years have passed since the operation. In the second instance, although the patient ultimately died, three tappings, at intervals of two months each, gave immense relief, and, contrasted with another case in which, owing, in great part, to the objections of the patient, the fluid was allowed to continue accumulating until death was so nearly reached that the operation was valueless, I have no doubt they not only prolonged life, but rendered it more endurable. In brief, it seems to me, that both theory and practice support the plan of tapping in ascites, whatever be the cause of it, before any extreme pressure is exerted by the fluid on vital organs, and before those organs are subjected to disturbance of function and displacement.

*COMMENCEMENT OF DROPSY AS A POINT IN
DIAGNOSIS.*



PROPOS of the subject of dropsy, there has seemed to me to be one very good mechanical indication for distinguishing whether dropsical effusion springs from disease of the heart, or from disease of the liver, or the first local seat of the effusion. If dropsical effusion begins in the lower extremities, and proceeds to the abdomen, the evidence is fairly sound that the obstruction is direct from the heart, and that the liver is free, the stagnation and transudation being due to a failure of the return column of blood from the extreme parts. If, on the other hand, the accumulation of fluid begins in the abdomen, and extends to the lower limbs, the evidence is equally good that the arrest of the circulation is in the hepatic system. This distinction may be of moment sometimes in deciding on the question of tapping. In a case where the dropsy occurred first in the extremities, and afterwards in the abdomen, it would be good practice to delay the tapping until the effect of removing fluid by puncture of the lower limbs had been carried out. But in a case where the effusion is, primarily, into the peritoneum, and afterwards into the extremities, tapping the abdomen would have a prior place to puncture. The rule would run, in cases where there is ascites and anasarca: Tap for primary ascites, puncture for primary anasarca. I refer, of course, in this note to chronic ascites and chronic anasarca uncomplicated; not to special dropsies of local origin, like ovarian cysts, and not to dropsy from renal disease.

A PROPER TEMPERATURE FOR MENTAL WORK.

IT falls to my lot to spend a considerable number of hours of the morning and evening in the study. It is always a pleasure, for the study is as a garden full of treasures. Books ever come as friends; the more we have of them, of all sorts, the better; they never tire and they never quarrel. Also it is a good healthy pleasure to be at work at composition; anyway, it is not to me, as it was to Cowper, the most exhaustive of labours; on the contrary, when kept within due limits, it is refreshing and strengthening. In order, however, to arrive at comfort and health in the study, it is necessary to learn how to keep the air of the room in proper condition for sustaining work. Foremost amongst the conditions necessary is the temperature of the air. If that be unequal, study is unequal. I have become from long practice and experiment perfectly sure of this, and have arrived at the sure conclusion that all the year round the best degree of temperature for mental work is 64° Fahr., 18° Cent. If the temperature falls much below this, the mind becomes drowsy and inactive; if it rises much above this, there is a relaxed state of body and mind which soon leads to fatigue and exhaustion. The degree of temperature is the first point to bear in mind. After that it deserves to be particularly remembered, that the said temperature should be uniform throughout the room, and that it should be steadily maintained all the time that the work is going on. A fluctuating temperature is very bad; a temperature so unevenly distributed that the upper part of the body is hot while the feet are cold is

fatal to good work. As a means towards attaining this equality of temperature the open fire-grate, with all its temptations, is a failure in the study. The student forgets to attend to the fire. It is down at one moment to a cinder, it is up at another moment in a blaze. It creates draughts. It warms the front part of the body, and not the back; the right side, and not the left, or *vice versâ*. The best way to warm the study equally, for good, steady work, is to have a stove which brings in the purest air that can be got from the outside, which warms the air in its passage into the room, distributes the warm air equally, and makes all draught go out of the room, instead of into it, by the doors and the windows. This arrangement I estimate as worth two hours' study a day, and that to a busy man is no trifling acquisition of time, to say nothing of the labour also economised. It is equal to working in a mild summer air during the coldest seasons.

THE BRONCHIAL SECRETION AS AN ABSORBENT.

IN January last, while suffering from a bronchial cold, accompanied with rather free secretion from the bronchial surface, I discovered on the morning of the 18th that the secretion had a peculiar and foetid odour. I detected this first in the pocket-handkerchief I was using, and surmised at first that the odour might by some accident have come from it, although it was quite clean. I therefore obtained another handkerchief which certainly had no odour, but the result was the same whenever the bronchial secretion came in contact with it. Fresh cotton wool receiving the secretion had also the bad odour imparted to it.

I should have felt anxious but for the circumstance that I recognised the odour of some decomposing animal matter which I had detected on the table of the laboratory on the preceding day when at work there. I sought, therefore, for the offending cause, and found it in a Leyden jar, which contained a portion of the brain of a sheep that had undergone decomposition, and that had not been removed. I closed the jar, took a carriage drive into the suburbs of London, indulged in a good brisk walk, and returning home, found the expectoration free of all fœtor. The next morning, the expectoration being still free of fœtor, I re-opened the jar, and breathing near it for a short time, found that the secretion was rapidly re-infected, and that it was just as easy to communicate the odour to the expectoration as it was to the moist hand, to moistened cotton wool, or to a watery solution of albumen.

This little observation seems to me of moment as explaining the mode in which some infections are directly communicated. When we consider the large area of the bronchial surface, and its position in relation to the blood, we can easily see how the whole volume of the blood may be poisoned from prolonged inhalation of air charged with putrid matter. The observation is also useful in showing how quickly fresh air, even near London, removes the danger. It may be that in some diseases, affecting the nasal organs and upper part of the throat, the great benefit which so often accrues from even a few days' change into pure air at the seaside, may be due to the deodorising effects of the air on nasal and bronchial secretions in a state of partial decomposition.

RECORDS OF TEMPERAMENTS IN DISEASE

OME practitioners, using the clinical notebook described in Vol. I. of *THE ASCLEPIAD* (pp. 35-38), have inquired the best plan for recording temperaments, to which the following may be an answer :—

It is most practical to keep to the old view of four primary temperaments,—the Sanguine, the Nervous, the Bilious, the Lymphatic.

The Sanguine.—The body lithe and active; the complexion ruddy and freckled; the hair sandy or light-auburn; the eyes grey or light-hazel; the mind resolute, active, sanguine.

The Nervous.—The body light of build, rather slow of movement; the complexion fair; the expression thoughtful and intelligent; the hair flaxen, or very light-brown; the eyes blue, or bluish-grey; the mind active; but, as is commonly said, nervous.

The Bilious.—The body inclined to be heavy, but often powerful; the complexion dark; the hair dark; the eyes dark; the mind thoughtful, reflective, determined, and often sad; bilious.

The Lymphatic.—The body large and cumbrous; the muscles large and flaccid; the movements slow and hesitating; the complexion pale; the expression heavy and dull; the hair light and scanty; the eyes bluish-grey; the mind slow, but not unhappy—rather, in fact, of easy and careless disposition; supine, lymphatic.

In a little time the observer soon sees the combinations of these temperaments, and writes the temperament down, whether it be simple or compound, almost at a glance.

*ON ARTERIAL PULSATION AS A PREMONITORY SIGN
OF GANGRENE OF THE EXTREMITIES.*

NE of the preliminary symptoms of senile gangrene affecting the lower part of the extremities is a strong and resistant arterial pulsation of one or more of the main vessels of the limb above the foot, or of the foot itself.

The pulsation is often so powerful as to be actually visible; it is to be felt along the whole line of the vessel, and it is always felt at intervals by the patient, who is given to describe it as a palpitation or fluttering. The pulsation not only precedes the indications of gangrene, but continues throughout, and may be a troublesome and even a painful complication. It is due, I presume, to the resistance to the course of the blood in the extreme parts of the arterial circuit, and may be accepted as an indication of thickening or of ossification of the arterial coats. If under auscultation of the pulsating artery a murmur is detectable, and if that murmur is not traceable to conduction along the line of the vessel towards the heart, ossification may be considered as present.

I have met with the same peculiar pulsation of the arteries of the lower extremities in the aged, where there has been senile ulceration instead of gangrene. In such instances it is not so persistent, but it is equally pathognomonic. It means, as in gangrene, resistance in the peripheral surface from degenerative change, a nutrition, and imperfect reparation of structure.

*A REMARKABLE CASE OF AORTIC-INNOMINATE ANEURISM.**

IHAVE the honour to place before the Society what I think is, in some respects, one of the most remarkable cases on record of an aneurism springing from the aortic arch, and extending into the innominate artery. I say the case is remarkable, because the external indications of aneurism were recurrent, and were in the most singular degree free from all the distressing secondary symptoms which usually attend aneurismal dilatation of the great thoracic vessels.

The patient was a woman sixty-two years of age; her eyes light-hazel, her hair brown, her complexion inclined to be ruddy. A temperament bilious-sanguine. Her hereditary history was good. Her father lived to seventy, dying of nephritis. Her mother lived to over eighty-four, sinking from senile decay. Her brothers and sisters were healthy, and she knew of no instance of heart-disease, arterial disease, rheumatism, or constitutional specific disease in her family. Her own life, up to the age of fifty, was very healthy. She was temperate in living, and although of active disposition, was

* Read before the Medical Society of London, December 21st, 1885.

not given to excitement, and was exposed to no special cause of aneurism from strain or overwork. At the age of twenty she had a small goitre, which still existed in a slight degree. She was the mother of eleven children, but her *accouchements* had all been natural, and her children had grown up well and strong. Twelve years ago she suffered from severe bronchitis, during recovery from which she had a sharp attack of inflammatory pain with swelling in the left upper maxillary bone. The bone was tender to external pressure, with discharge into the nose. For relief from this she went to the National Dental Hospital, where she came under the able care of the late Mr. Perkins, who sent her to me as one of the consulting physicians.

On her visit to me I diagnosed abscess within the antrum; extracted a tooth from the upper jaw, and let out readily, by an after-puncture into the antrum, over a drachm of greenish but not offensive purulent matter. The operation gave her great relief. I washed out the cavity freely several times with solution of tannin and iodine, and at one time recovery seemed certain. Then there was a relapse, with free discharge from the nose and constant irritation, with extrusion of small portions of exfoliated bone. I placed her, thereupon, under the care of our esteemed colleague Mr. Francis Mason, who performed upon her one of his admirable facial operations, which, as he has described it in full, in his work on the surgery of the face, p. 15, I may pass by, with the note that he laid open the antrum by a reflected flap from a single incision through the medium line of the upper lip, and insured, in the end, so perfect a cure that not a trace of disfigurement remained.

I saw no more of this patient until October 1884, when she came to consult me about an external swelling in her chest, on the right side, above the breast. On examination, I discovered a large pulsating tumour, of the size and shape of half a moderate-sized orange. The skin over it was extremely tense, and contrasted strongly with the surrounding skin, being of bright red colour, and the depth of tissue between it and the fluid beneath seemed but a few lines in thickness. The position of the tumour is indicated in the subjoined diagram :—

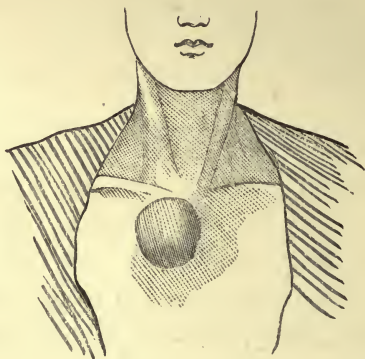


FIG. 1.

The edge of the swelling on its left side extended to the sternum, and it reached across, towards the right from that point, for a space of three inches. The lower border of it was the fourth rib; the upper the clavicle. There was clear evidence of fluid within its walls, and on auscultation it yielded at every part an extremely loud bruit coincident with the systolic cardiac sound. The pulsations were synchronous with the beat of the heart and the radial pulse. The heart sounds themselves were clear, and I may say, in a word, that except for this tumour the patient had not an

unhealthy symptom. For the tumour she herself could assign no cause; no strain, no blow, no illness. It came first, she said, about three months previously as "a small pulsating nut" (I use her own words) "between the ribs," and gradually became larger and larger, until it arrived at the stage just described. The radial pulses on the two sides were synchronous, but the pulse on the right side was feeble, on the left full. The heart was of normal size, but there was an aortic murmur.

With as delicate a pressure as I could use I applied the sphygmograph to the pulsating tumour, and obtained the following tracing (Fig. 2), which showed clearly its arterial character. The tracing was taken from the crest or central point of the tumour.

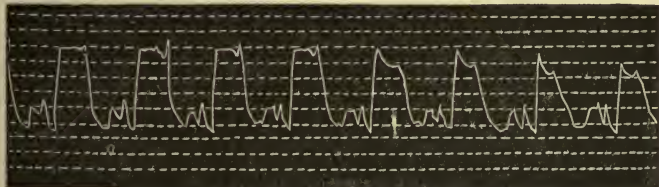


FIG. 2.

Diagnosing aortic aneurism so advanced that death might take place at any moment by rupture through the tissues and hæmorrhage, I cautiously apprised the patient of her danger. I advised her to ride home (she had walked from her own house to mine, nearly two miles); to go at once to bed, to remain entirely in the recumbent position, to live on vegetable diet with milk, to avoid all stimulants, and to find in complete rest the best chance of recovery. I prescribed potassium iodide internally in ten-grain doses, three times a day, and gave her the address of a medical neighbour of hers, under whose care she should permanently place herself.

I saw and heard no more of this patient for several months, and not unnaturally supposed that she had died; the more so as some inquiries respecting her caused me to find that she had not consulted my medical friend. In fact, I lost sight of her altogether, until the month of May 1885, when she again called to tell me that she had, she believed, recovered. To my surprise, the large pulsating tumour had now absolutely disappeared, the thorax was perfectly flat, and to the eye natural. I could detect no trace of any opening or depression, could find no indication of absorption of rib or sternum, nor other external sign. Pulsation, however, could still, on close inspection, be seen between the first and second and second and third ribs. There was an extensive region of dulness on percussion; there was a loud aneurismal bruit; and, the right radial pulse was still feebler than the left. The account she gave me of herself, since her last visit, was that she carried out my advice, placed herself for many weeks on a sofa bed, took her medicine for a time, and found the tumour gradually decrease. It went down, she said, "by getting generally smaller over the whole of it until it disappeared." She was still conscious of pulsation, and if she exerted herself, there was a slight rising at a point which she indicated as between the first and second rib, an inch from the sternum on the right side.

Repeating my precautions, and giving her some directions as to diet, I dismissed this patient, requesting she would come again in three months, or earlier if any change took place. She came on June 27th, presenting the following conditions. She had now three pulsating tumours. One was situated above the right clavicle, in the line of the common carotid. It was of the size

of a fair-sized walnut, with the sharp or conical end projecting forwards and upwards. The second tumour, of equal size, was protruded beneath the right clavicle, in a line between the first and second rib, and approaching towards the right edge of the sternum. This tumour was one inch and a half at its narrowest part, and two inches at its longest. The third tumour was over the sternum, and was separated by a sharp division from the one last described; its upper edge reached to the insertion of the left sterno-cleido. It was larger than its fellow, and rather more pointed.

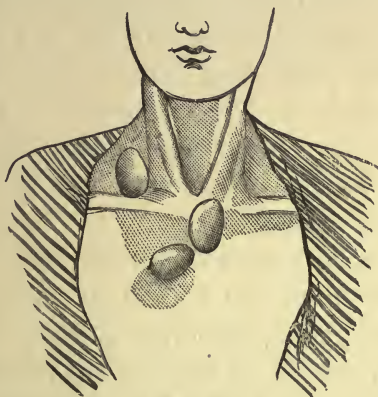


FIG. 3.

The sketch above (Fig. 3) conveys better than any verbal description the relative size of the tumours and their positions to each other. All the tumours pulsated synchronously with themselves and with the radial arteries. A loud bruit was heard at each of them. The two below the clavicle presented much greater thinness of covering than the one in the neck, and from the latter I was able to take a sphygmogram, to be described later on, which is quite unique, I believe, as an arterial tracing.

On June 29th, my friend Mr. Square, of Plymouth, being in the consulting room when the patient arrived on that day, I had the great advantage of his opinion on the case. He made a most careful examination. In his long experience he had met with nothing similar. He agreed with me that the three pulsating tumours were aneurisms, the two lower from the aorta, the one above the clavicle from the innominate, with an extension along the common carotid. He thought that the protrusions below the clavicle were entirely through the intercostal spaces, and that there was no absorption of bone. His recommendation was return to absolute rest, and to follow out the same regimen that had before been prescribed. He agreed with me, after careful discussion of every point, that no operative measure could be recommended that promised to give even temporary relief, while any such might hasten the impending fatal termination.

For some weeks longer I saw the patient at intervals of a week or ten days apart until my vacation, on returning from which, on September 30th, I found another series of changes. The tumour that had been furthest from the sternum and below the clavicle had entirely disappeared. The tumour above the clavicle was still there, but had become very firm, as if filled with a firm clot, and had ceased to pulsate at points over its surface, but was raised, with each pulsation, altogether. The tumour over the sternum was more tense than before; it pulsated from every part of its surface, and the surface itself had become slightly dark in colour.

On October 11th, Mr. George Brown was with me when the patient arrived, and he also made a long and careful examination. The discolouration and thinning of structure in the lower tumour had now proceeded so

far that we both counselled, strongly, her return to bed and complete rest. She, nevertheless, managed to go about a few days longer, but finally took to bed on October 17th, 1885.

From that time onwards I continued to visit this patient at her own home. The tumour in the neck remained as before. There was no re-appearance of the tumour that had subsided, but the tumour near the sternum became much more discoloured; and on October 28th, through one or two minute openings, red blood escaped. I now coated the surface with a layer of per-chloride of iron wool, putting over that a cover of dry wool, and retaining both neatly and firmly by long strips of plaster. Under this covering a clot formed, and bleeding ceased.

On November 13th, my excellent friend, Dr. John Lowe, was good enough to go with me to see this patient, and to take part in obtaining sphygmographic tracings from the radial pulses and the pulsating tumour in the neck. A report of her condition at that moment will afford a clinical history of her symptoms throughout. She was quite cheerful. Her mind and all her cerebral functions were natural; her pupils were perfectly normal. She could swallow foods and drinks without difficulty, and relished food. Her digestive system was entirely natural, her general nutrition healthy. Her urine was normal. Her breathing was perfectly free, and she never at any moment, nor indeed until the end, had any approach towards cough or dyspnœa. She complained at times of rheumatic pains, the principal point of pain being on the left side, a little above the ischium; but I believe these pains were rather due to the constrained position in which she was constantly kept than to any other cause. They were removed by change of position,

they never affected the respiration, and had no character of angina. In a sentence, with the exception of the particular disease of the great bloodvessels, she was in all respects as healthy a woman and as free from complaint as could, at her age, be met with. The lower thoracic tumour was pulsating from every point as before, and when we removed the dressing to apply fresh hæmostatic cotton, we found that there had been a little oozing of blood, but not more than a few drops, which had coagulated. We took readings of the pulse from the radial on each side, and from the tumour in the neck. As before, the pulsation of the radial on the right side was feebler than on the left.

The sphygmographic radial tracing on the right side (Fig. 4) showed an impulse stroke, under a weight of three ounces, of two degrees, according to my standard scale, and a return of four and a half degrees in one almost unbroken curve, without any indication of arterial recoil, or of aortic chuck. The motion was extremely regular and uniform.

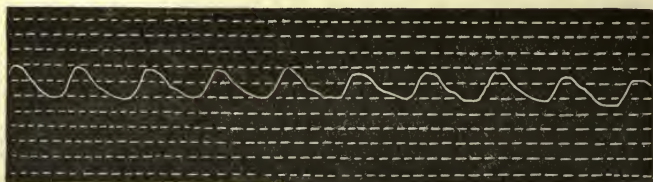


FIG. 4.

The tracing from the left radial pulse showed an impulse stroke of four degrees, at a pressure of three and three-quarter ounces; a first descending stroke of a quarter degree; an ascending curve of a quarter degree; a descent of four degrees to the base line; an aortic chuck with a rise of half a degree; and a straight line of three to four degrees to the foot of the next

ascent. These included the six events, but out of their natural order, the ventricular recoil following, instead of preceding, the arterial. The events are less uniform than on the right side (Fig. 5).

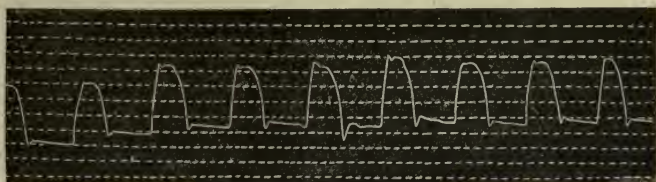


FIG. 5.

The tracing from the tumour in the neck is very singular, and is, I think, the first that has been taken from a dilated artery, filled with a firm mass of fibrine. It required a six-ounce pressure to obtain the reading. In all cases the first impulse stroke is four degrees, and very straight. The first descent is three degrees. Then follows a second ascent of three degrees, terminating in three sharp diminishing ascents and descents, in corkscrew form, to end in an irregular final curve extending to the base of the next ascending line. The motion throughout is regular and uniform (Fig. 6).

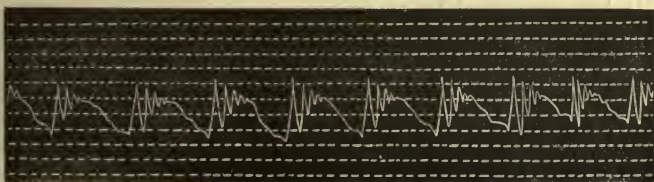


FIG. 6.

Continuing the clinical history, the patient remained in much the same condition from the 13th of November until the 18th. On the 18th she experienced for the first time a difficulty in swallowing. On the 19th this difficulty increased, and food swallowed, after being

retained a little time, was returned. This difficulty continued until the 23rd, but was removed by substituting cold for warm drinks, after which she was able to take milk, and jellies, and beef tea, in amply sufficient quantities to sustain life. She was still kept in one position, and when the dressing on the lower aneurism became loose, or in the slightest degree offensive, I carefully removed it, and replaced fresh wool. During the last three dressings I fully expected that death would take place from hæmorrhage, and prepared the friends for that event, for the small openings had now all joined into one, and there simply lay for protection a clot of coagulated blood protruding through an oval opening, with rounded edges, three-quarters of an inch long and half an inch across. Nothing, however, of this kind happened, and the patient lived on until half-past ten A.M. on November 30th, when she, of her own will, rose in bed for action of the bowels, became faint, sank back, and died without any struggle or sign of pain.

POST MORTEM.

The *post mortem* was conducted by Dr. Lowe and myself on the following morning, December 1st. We carefully dissected out and removed the aneurism entire; it has been well preserved since then in vapour of ammonia, and it is now before the Society, as little altered from its original state as possible. The right side of the heart is laid open from the front; the left side, the arch of the aorta, and the aneurismal sac, are laid open from behind. The aneurism will be seen to spring quite from the arch, and to include the innominate artery. The sac is three inches and a half long by three in width. At its upper part it is prolonged into a pouch like the finger of a glove, and this it is which

forms the pulsating tumour in the neck, the carotid lying behind it. From the fore part of the sac there extends the pouch, forming the pulsating tumour over the sternum, from which the blood escaped. The opening for it was between the first and second rib, but there had been some absorption of bone, and also some absorption, from underpressure, of the sternal end of the clavicle, on the left side.

The aneurism, on its under-surface, pressed backwards and downwards, obliquely, towards the left. It extended a little between the trachea and the esophagus, and slightly displaced the esophagus to the left. It rested on the spinal column, and had produced, by absorption from pressure, three deep and finely-moulded grooves in the antero-lateral sides of the bodies of the two last cervical and first dorsal vertebræ.

The sac itself, as will be seen, is nearly filled with laminated fibrine. The portion of it in the neck is completely filled. In the lower tumour the portion of the sac that was presented to the skin is completely absorbed with the skin, so that in fact the aneurism is open to the skin, except for the loose clot of red blood lying between the fibrinous clot and the opening. Between the first and second rib, on the right side, is the opening through the intercostal space from which the extrusion which had receded once escaped.

The thyroid gland is enlarged generally, but has no connection with the aneurism, and is healthy in structure.

The heart is of natural size, and the valvular mechanism normal, except that the aortic valves are somewhat thickened, and that there is a point of calcareous degeneration at the base of the aorta.

The lungs, the digestive organs, the liver, the spleen,

and the kidneys, are quite healthy. The brain was not examined.

COMMENTARY.

A case such as is here described opens up, naturally, a large number of the most interesting practical reflections, and will, I am sure, draw from the Fellows of this essentially practical Society many useful observations. To one or two points I would briefly refer.

I. It strikes me as most singular that such a distinctive aneurism should have been developed without any traceable cause, either individual or constitutional. Of constitutional diathesis there was no trace whatever. Of causes directly affecting the patient herself, such as specific disease, there was also no evidence; there was no known strain, or blow, or accident.

If there were any one cause, direct or indirect, it was the enlargement of the thyroid. But in this there could be no necessary relationship as cause leading to effect. The goitre, I think, could be merely a coincidence. But I leave it for discussion.

II. The second point I would notice is the peculiar course which the aneurism took after its first development. That it should at first dissect its way, pushing the pleura before it, perforating an intercostal space, diffusing to the size it did, and then, under rest, retract so as to return into the thoracic cavity, is, according to my experience, quite novel. The fact that afterwards it should remain quiescent for some months, and without any obvious reason should again push its way outwards, this time in three directions, so as to appear once more on the surface, with recession later on of one of its extrusions, is another series of events for which, I think, there are very few examples indeed in the history of aneurismal disease.

III. Scarcely less singular is the circumstance of the entire freedom of the patient from any kind of thoracic complication. That there should have been no dyspnœa, no cough, no angina, and, up to within a few days of death, no dysphagia; that all the nerve tracts, phrenic, recurrent, laryngeal, pneumogastric, should have been left untouched; that the cerebral circulation should have been entirely undisturbed; that there should have been no arrested nutrition in any peripheral surface fed from the innominate, is to me so extraordinary that, if I had not witnessed the facts, throughout, with my own eyes, I should, I fear, have doubted the very possibility of their occurrence. I can only look upon the case as an accidental variation of the rarest order; a misadventure, if I may so express it, in the natural course of disease, with the wholesome lesson written upon it, how dangerous it is to be too dogmatic in diagnosis.

IV. The long continuance of life under the conditions we have seen is the last point on which, under this head, I shall make comment. For many weeks the life of the patient depended on the slight barrier of a moderately firm clot of blood, and we may say that, for the many months during which she continued to move about, she was protected by the merest coating of membranes from instant death. I assume that adhesion to the pleural membrane, and the strength of that membrane, must account for the long protection that was afforded.

DIAGNOSIS.

From the commencement to the termination of the case there was no real obscurity as to the diagnosis of aneurism, and in every particular, except one, the diagnosis was correct. The one slight false reading, nevertheless, deserves notice.

This error was the supposition that the pointed pulsating tumour in the neck was a continuance of the dilatation through the common carotid artery, while it was in reality a pouch or involution of the innominate itself in front of the carotid. The distinction is important, because what existed explains the reason why the circulation in the cerebral centres continued so free and natural as to maintain the nervous balance until the end. The current of blood through the carotid, behind the pulsating tumour and concealed by it, continued sufficiently its natural course. It did not escape my curiosity that, with a plugged common carotid, as I assumed, the cerebral functions continued unchanged, and I pointed out the peculiarity to Dr. Lowe, but I was completely at sea in respect to explanation. Another time the same diagnostic puzzle will be easier.

THE SPHYGMOGRAPHIC READINGS.

I have said that the diagnosis was sufficiently clear, generally, from the first. This was so, but I am bound to add that I experienced great corroborative service from the use of the sphygmograph. I called attention to the use of the sphygmograph in the diagnosis of aneurism some months since in *THE ASCLEPIAD*, and as it refers to a very useful aid in practice, it may be well to dwell upon it again for one or two minutes.

The service rendered by the sphygmograph is, first, that it differentiates between true aneurismal pulsation and the pulsation of a normal artery through a solid or fluid tumour overlying the artery; secondly, that it explains whether the contents of an aneurism are fluid or whether there has been solidification from separation of fibrine.

Briefly, in aneurism, the sphygmograph, although it

gives a series of readings differing from those of the radial pulse, yields another series strictly symptomatic of arterial resistance under work being done by the heart. The impulse of the ventricle is always written by it, and there follows upon that a series of angular curves, indicating the wave-like recession of the column of blood within the cavity. This continues so long as the blood remains fluid, and with the distinctive peculiarity that, as the pressure on the walls of the cavity from the blood is, according to the physical law of pressure, equal in all directions, so the tracing can be obtained from every point on which the stem of the sphygmograph can be placed.

In the example of our patient this was signally the case, and it will be seen, by the reading, that the wave recession was marked by a line of gradational impulses presenting almost a spiral figure, which may perhaps one day be denominated as the reading of an aneurism at that stage of it when the elastic coat is still intact and the blood fluid, but when the muscular mechanism is destroyed. The same figure can be obtained, experimentally, by the elastic recession from external pressure made on an elastic spherical cylinder like an india-rubber ball.

This is one reading which the present case exhibits; but there is another. When solidification has taken place within an aneurismal sac the fact may be determined by the sense of touch, and by the firmness of the contents. The sphygmograph indicates this change by an additional proof; for now the reading cannot be taken from any point, as it could be when the blood was fluid; while the pressure, which then could scarcely be too slight, has now to be increased to four, or it may be six ounces.

ON TREATMENT.

On the subject of treatment, I have really little to add that would be useful. From the beginning, next to rest, only one reasonable local remedy offered itself, and that was galvano-puncture. I discussed this both with Mr. Square and Dr. Lowe, but we abstained, and, as the result proved, wisely. If the formation of a large coagulum were the desired object, nature herself did that for us far better than we could have done it, but she did not effect a cure.

Two temporary measures of treatment may be named, however, as useful for remembrance. The action of the styptic iron cotton left nothing whatever to be desired. It produced no irritation; it caused a firm coagulum, and for many weeks, and indeed to the end, prevented death from sudden hæmorrhage, a termination so much dreaded and so happily escaped from. The second point of practice is minor, yet not without its value; I mean the successful administration of cold drinks when the esophagus was obstructed by pressure, and when warm drinks, swallowed with extreme difficulty, were immediately rejected.

I believe these are the most direct subjects of treatment which the case offers, but I would not willingly leave out one more, which a distinguished President of this Society, the late Mr. Hilton, left us as his last legacy of experience and thought: namely, the physiological value of rest. In my long medical career, I have never had a better illustration of the value of rest than in the subsidence under it, for many months, of the external aneurismal tumour, which in my patient was so remarkable an event.

It has, indeed, been a cause of much regret to me

that the rest, so earnestly enjoined, was not determinately continued for many months after the subsidence of the first external protrusion.

ADDENDUM ON POTASSIUM IODIDE.

I must not close without adding one word on the administration of the potassium iodide, that being the topic which caused most interest in the debate on the case at the Medical Society. It is fair to say that during the period when the aneurismal tumour underwent its first recession into the thorax, the patient was taking potassium iodide in full doses. But whether the favourable results which followed were due to the effects of this medicine, or to the absolute rest in the recumbent position, or to the two combined, is a very difficult point of practice, on which I would not venture to speculate from present knowledge.

In the later stages of the case, the iodide was again prescribed, but it provoked so much distaste that I could not enforce its administration. It caused loss of appetite, without any apparent commensurate service, and if I had insisted on its continued administration it would have sustained a mental disquietude which, in its way, would have interfered with that remedial rest so obviously beneficial at every stage.

*EXPERIMENTS TOWARDS THE ANIMAL
BATTERY BY COMPOUND SYNTHESIS
AND MICRO-ELECTROSCOPY.*

PART II.

*ATTEMPT AT CONSTRUCTION OF A BATTERY WITH
BLOOD AS THE EXCITING FLUID.*

IN the last ASCLEPIAD I described a compound synthetical research, in which an attempt was made to charge the brain and other dead animal structures with electricity, after the method of charging the Leyden jar. The effort was successful in many directions of research, and since the publication of it has received confirmation from repeated experiment.

In the same communication a description was given of some other experiments, in which, by the electrical decomposition of blood, and by electric vibration, the blood was transformed into new structural combinations resembling organic textures, and presenting changes which suggest that under electrical discharge there may be developed from dead organic material, cellular and other forms, bearing close resemblances to certain tissues which enter into the composition of living organisms. These results have also been confirmed during the past quarter, and so much extended that they alone would afford sufficient matter for the present essay. I think it best, however, to leave them for this

time, in order to describe a new compound synthesis, by which a voltaic current has been produced by using blood as an exciting fluid, in place of the ordinary fluids employed in the battery for oxidation.

I began this research in the latter part of the year 1883, in the following way :—I charged a bichromate battery, the zinc and carbons both being new, and the jar perfectly clean, with blood freshly-drawn from a sheep that had just before been killed at the slaughter-house, in the ordinary way. The blood, so soon as it was drawn, was well whipped, to remove the fibrine, was filtered through flannel, and briskly agitated in the air until it became of a bright arterial colour. It was then put into the jar, and the carbon and zinc elements were introduced. The terminals of the elements were connected with the galvanometer, and a current discovered that caused the needle to be deflected 10° , and remain steadily fixed at that point for six hours, after which it slowly returned to its natural position.

Another portion of blood, from the same source, was placed in another jar, and made to receive the carbon and zinc elements in the same way. The electrodes were then connected with Professor Hughes' induction electric balance. The new battery proved amply sufficient to charge the induction coil, and to work the telephone as completely as the Lechance's cell usually employed for the purpose.

Recently, I have returned to this line of investigation, with some results now to be related.

PRELIMINARY NOTES.

As a preliminary note on the new effort in compound synthesis—the principles of which were explained in the last ASCLEPIAD,—I would indicate that the lines of research intended to be followed have been to bring

together organic and inorganic materials in the first place, so as to ensure, if possible, the production of a measurable current of electricity, and then by withdrawing, one by one, the inorganic parts, and substituting for what was withdrawn an organic substance, to obtain a battery made entirely of organic materials.

With this principle before me I chose zinc as the substance to be oxidized; carbon as the conducting element; an earthenware or membranous inner cell as the separating part of the two elements; blood as the exciting fluid in contact with the zinc, and Thames water, in an outer earthenware cell, for receiving the carbon. For conductors attached to the elements I used German silver wire, the conductors being all of the same size, length, and weight. They were each one foot long, and of large size, so as to offer the least possible external resistance. The inorganic cell employed was the ordinary red earthenware porous cell. The organic cell was constructed of peritoneal membrane, shaped to match the earthenware cell, and suspended from a strong gutta percha mouth or ring. The blood in every case was blood caught by the butcher at the slaughterhouse, direct from the neck of the sheep, into a clean vessel. In some cases the blood was defibrinated at once by brisk stirring; in other cases the blood was set aside at rest, in order that it might separate into clot and serum.

In testing for currents I used as standards a Lechanche cell, belonging to the induction balance of Professor Hughes; the induction balance itself; a small bichromate cell; and a tangent electrometer. The standard Lechanche cell rendered the telephonic signal through the induction balance down to zero, and caused deflection of the needle of the galvanometer,

fixed in the magnetic meridian, 40°. The bichromate cell worked an electro-magnetic apparatus, attached to a Stohrer's battery, freely. Previous to the commencement of each series of experiments all these several points were carefully tested, in order that uniform observations might be insured.*

EXPERIMENTAL TESTS.

Twenty fluid ounces of defibrinated sheep's blood at 60° Fahr. were put into an earthenware porous cell, and received the zinc bar used in the Fuller battery. Twenty fluid ounces of Thames water at 60° Fahr. were placed in the outer cell or jar, and received the carbon element. The conductors were attached with the elements, and afterwards by their free extremities were connected with the galvanometer. The current produced moved the needle 40°, and held it there steadily. The conductors were now removed from the galvanometer, and were connected with the primary coils of the induction balance, the secondary coil of which was at once so well charged as to work the telephonic signal down to zero of the scale. The new battery was, in fact, as effective as the Leclanche cell, which it had replaced. The conductors were once more removed, and were connected with the primary coil of the Stohrer's electro-magnetic machine. In this way it acted sufficiently well to set the machine in brisk action and induce magnetic electric discharges as strong as those caused by the bichromate jar usually employed for working the

* At a later period I shall have the opportunity of detailing with precision the measurements of the currents produced. At this stage, the research being qualitative only in regard to current, the arrangements indicated in the text are sufficient.

machine. The action was maintained without abatement for two hours, before it began to run down.

CHANGES IN THE BLOOD.

I.

The blood was poured originally in the fluid state into the inner cell containing the zinc element, and for a short time remained fluid, bubbles of gas accumulating on its upper surface. But very soon some unexpected phenomena took place while this action was in progress. The zinc element became coated all over its surface, where it was in contact with blood, with a firm layer of evenly-coagulated blood; the inner surface of the porous cell became, in like manner, coated with a firm layer of coagulated blood; while in the intervening space the blood remained quite fluid. The blood became dark in colour, but the water in the outer jar was made of bright pink colour from the passage into it through the porous cell of red colouring matter.

When I say that the blood surrounding the zinc, and that surrounding the inner surface of the porous cell was coagulated, I use the term for want of a better. The solidification of blood which had occurred was more like the formation of a dense leathery membrane than of a coagulum. From the inner surface of the porous cell I removed, in sections, a cylinder of this deposited blood structure, which, smooth as the inner coat of a large artery on its inner surface, was of buff, or almost white structure where it had been in contact with the jar, so that a transverse section showed two distinct lines, one of white, the other of dark structure. It was moderately tough, and when it was slowly dried it became much like cellulose, but now dark all through.

It was brittle in character, and broke with a bright, glass-like fracture.

This curious precipitation of a smooth and firm layer of blood within a cell, and the giving-up of a portion of the colouring matter of the layer to the water, on the other side of the cell, is the nearest approach I have ever seen, in experimental work, of the synthesis of an organic structure. The corpuscular matter, as such, was entirely changed in construction as well as in colour.

II.

In another experiment the details above quoted were repeated in all particulars save one. Instead of placing the defibrinated blood in an earthenware porous jar, I placed it in one of the membranous jars, made out of peritoneum. Another foreign element was, in this way, replaced by a structure that is natural to organic bodies. The results, as a battery, were the same as when the porous jar was used. The membrane soon became hydrated, and a dialysis from the blood was set up, which will be referred to more particularly at a future time, under the head "Electro-Dialysis."

III.

The results thus far had been so striking, they led me, naturally enough, to hope for others of great value and immediate response, from a continuance in a direct line of research. As the battery seemed to decline by failure of the exciting fluid, I thought it might be possible to restore action to the exciting fluid by making it absorb oxygen afresh, and so reproduce action. I, therefore, having removed the solid membranous-like structure from the zinc and inner surface of the porous jar, treated the remaining fluid blood freely to oxygen

gas. I let oxygen pass through the blood in a long jar, until the blood formed a column of small red bubbles. These I allowed to subside when they condensed into a rich arterial fluid. I, afterwards, exposed the zinc to this, apparently, re-oxidized blood. To my surprise the strong action which had been previously observed was no longer presented. A current sufficient to cause a deflection of the needle of the galvanometer 9° was excited, and the induction balance also acted down to 160° , a distance of 40° , but no more followed. There was no further solidification of blood, and no marked change of colour. For several days this blood continued quite liquid, and presented but one peculiarity, namely, that it remained free of putrefaction. The corpuscular matter had undergone solution, and the fluid, although heightened in colour by the oxygen, did not give up that gas so as to cause oxidation. I raised the temperature of the blood to 100° Fahr. to ascertain if that would show a different result, but nothing followed of an affirmative kind.

IV.

The blood from a sheep was caught in a clean earthenware jar while the animal was being killed, and was then set aside in order that it might naturally divide into clot and serum. When the separation was quite complete, with the clot in the centre of the clear and amber-coloured serum, I pushed down through the centre of the clot a coil of freshly amalgamated zinc,—presenting a surface of 48 square inches,—superficial. I next inserted the carbon element into the serum. On making connection of the electrodes with the secondary coil, a current of 40° and sufficient to work the electro-magnetic machine was at once set

up, and remained in good action for a period of two hours.

V.

The negative action of oxygen on blood which had ceased to excite led me to inquire what would be the effect of exposing freshly-drawn and defibrinated blood to the action of oxygen. Such blood was, thereupon, submitted to oxygen in free current for two hours at the ordinary atmospheric pressure and at 60° Fahr. To my surprise this blood produced a very feeble current, namely, 10° of deflection of the needle of the galvanometer. There was neither condensation nor solidification of blood in the porous cell, and no passage of colouring matter through the cell into the water on the other side.

VI.

A specimen of blood was brought to me after it had been defibrinated and exposed briskly to agitation in the air. It was of bright red arterial tint. It was placed, as in preceding experiments, in the cell, in contact with the zinc, with the carbon and water in the outer cell. In this experiment I witnessed once more the same partial results as were observed with the oxygenated blood. The needle was only deflected 10°, there was no condensation of blood within the inner cell, and no passage of colouring matter into the water of the outer cell.

VII.

The experiment above cited was modified by taking another specimen of sheep's blood and allowing it to stand in the air until it had become ammoniacal, dark, and offensive to the smell. In this state of primary decomposition the blood was used as an exciting fluid

in order to determine if it would give rise to a current. In this respect it failed. It caused no deflection of the needle of the galvanometer.

The substance of these inquiries, so far, is that upon an oxidizable body, such as zinc, blood under some conditions will act as an excitant, and that a battery can be constructed of five parts,—water, carbon, membrane, blood, zinc,—four of which are organic parts. One more step, in which the zinc will be replaced by an organic body capable of undergoing oxidation, and an animal battery may be producible.

To this advancement I will direct attention in a future chapter; but before I conclude the present I must note that in some conditions or states the blood is much more active than it is in others. It would seem that blood which is completely charged with oxygen is not so active as blood which has been retained, for a time, excluded partly from the air. I thought that under the last named condition it might perhaps have undergone some fermentative decomposition, in which there was a development of an organic acid. Here, however, inquiry into the matter did not prove the correctness of the idea, for the fluid was of neutral reaction at a time when its exciting power was most determinate. Still it seems as if blood, when it plays the part of an excitant, does first oxidize something in its own structure, and that the oxidation of the zinc is a secondary change, accompanied by coagulation and separation of colouring substance.

COTEMPORARY PRACTICE AND LITERATURE.

"Every physician will and ought to make observations from his own experience ; but he will be able to make a better judgment and juster observations by comparing what he reads and what he sees together."—FRIEND.

HYDROPHOBIA PER SIMILIA.

HE treatment of hydrophobia by inoculation has been of late the chief subject of discussion in medicine. Numbers of persons have visited Paris for the treatment ; large sums of money have been subscribed for the foundation of a great inoculatory institution ; and a commission of inquiry is, it is reported, about to proceed to Paris, from England, for purposes of observation.

Not one of these facts, however, nor all of them together, ought to prevent every prudent and sensible person from withholding a hasty judgment on the merits of this system of cure. No insinuations as to motives, no fears of opposing the popular voice, should stop the better voice of demand for the most perfect proofs of the truth, the whole truth, and nothing but the truth.

From what is already before the public, the following reasons and questions are clear against a hasty verdict :—

1. There have been six deaths from hydrophobia in patients under the inoculatory treatment. If the hypothesis on which the treatment rests be correct, these deaths should not have occurred, and they alone

are sufficient to prompt the most serious doubts. For these deaths there are excuses, but no satisfactory or clear explanations.

2. Up to this time no sufficient period has elapsed to allow of any safe prediction as to the fate of the other persons who have veritably been bitten by a rabid animal and afterwards inoculated.

3. On the hypothesis set forth it is assumed that if a person who has not been bitten by a rabid animal were subjected to inoculation from the artificially prepared virus, he would suffer from hydrophobia, synthetically induced by the operation. But several hundred persons have been inoculated, and none have suffered the disease from the synthetical experiment. We are, therefore, made to infer that amongst all these inoculated persons not one had escaped from contracting hydrophobia from the bite of an animal. Is that a probable, not to say possible event?

4. A comparison has been struck between this plan of inoculation against hydrophobia and vaccination. The comparison is incorrect. Vaccination induces a specific train of symptoms, fever and local eruption; in fact, a definite disease. But this inoculation against hydrophobia induces no disease, general or local.

5. In these inoculations for the assumed cure of hydrophobia several hundred persons have had injected under their skin and into their cellular tissue a portion of diseased spinal cord from the dead rabbit in a solution of what is called "sterilised" broth. Some of these persons have been injected ten times or more, so that we must assume that between three and four thousand injections of dead animal matter have been made into the cellular tissue of living beings. Yet in no case has there been any report of abscess, of

sympathetic irritation, or of fever. It could hardly be imagined that so many injections even of distilled water could have been made with so much impunity. The infected matter must be sterilised indeed, to reach such perfection of general and local inactivity.

6. This criticism suggests another. If all the good results declared have followed upon inoculations so perfectly innocuous locally and generally, is it certain that the preventive effect may not be due to sterilised broth alone? To prove that it is not, an equal series of controlling or comparative observations would require to be instituted.

7. It is not very easy to understand the manipulations of the spinal cords of the infected rabbits in order to insure specific strengths of virus for different inoculations. The cord is divided into segments which are afterwards treated in different ways of drying, and to other processes. But is each segment weighed, or is it cut by mere accidental eye measurement? Does the vascularity of the piece cut make no difference? Does the specific gravity of the piece cut make no difference? These points in a matter so refined should be defined with the utmost nicety. When morphia is injected under the skin the operator is specially careful as to the weight of the alkaloidal dose; he refines down to parts of a grain. Is virus from a poisoned animal less fearable and feared? Perhaps not, but the facts should be explicitly understood, or some future experimentalist may be operating from an inch of the spinal cord, when a few lines would answer.

8. Amongst the persons who have been inoculated, some must have been bitten through their clothes. Have these been included with all the cured?

9. Amongst those inoculated, many must have been

treated locally, by caustics and other treatment. Have these been included with all the cured? In other words, has allowance of any kind been made for previous treatments?

10. The effect of the bite of a dog on the mind of the person bitten varies with the peculiarity of the temperament. In some persons fear alone would lead to an exaggeration of every detail, would suggest that an innocuous dog was rabid, and fill the sufferer with the sincerest belief that he was fatally wounded. In the large number of persons who have been to Paris for inoculation, have the representatives of this class been duly eliminated? Is it assumed that all, and all alike, of the inoculated have been alike cured?

If to these natural inquiries there be no definite answers, then a more imposing house of cards was never erected than has been run up to indicate the cure of hydrophobia per similia.

SYNTHESIS OF URIC ACID.

(By P. W. LATHAM, M.D.)

NO research of the past quarter surpasses in importance Professor Latham's admirable research on the synthesis of uric acid, published in a short but really historical paper in the *Lancet* for February 6th, 1886, pp. 244-5. Following the original experiments of Horbaczewski, published in 1882 and in 1885, Latham took thirty grains of glycocine and three hundred of urea, and put them into an ordinary test-tube (6 in. by $\frac{3}{4}$ in.). Having inserted a thermometer, to note the exact temperature, the test-tube was then placed in an

oil bath, the temperature of which had been previously raised to 230° C. The bath was maintained at this temperature, and the heat so arranged that the bath could be raised in a few seconds to 240° . The mixture of glycocine and urea quickly melts; at 110° it begins to boil, and ammonia is given off; as the temperature rises it begins to froth up, and between 175° and 180° does so to a considerable extent. By raising the test-tube from the bath from time to time this action can be controlled, and the temperature kept at 180° for some minutes, until the ammonia comes off much less freely, and the mixture acquires a very faint yellowish tinge. The heat of the bath must then be rapidly raised to 240° and the temperature of the mixture in the test-tube quickly raised to 210° . At 210° to 212° for five minutes, the mixture will acquire the colour of brown sherry, perfectly clear. The test-tube can now be removed from the bath and allowed to cool, the mass of a very pale fawn colour can be almost dissolved in three ounces of warm water, with perfect solution on addition of solution of potash. The fluid is supersaturated with ammonium chloride, and a considerable excess of ammonia added. A mixture of two fluid drachms of the solution of ammonio-nitrate of silver of the British Pharmacopœia, the same quantity of the solution of ammonio-sulphate of magnesia and of strong solution of ammonia, is next added to the other liquid. A considerable brownish precipitate of the mixed urate and cyanurate of silver is thrown down. After twenty-four hours decant off the supernatant liquid, and wash the precipitate with water, to which a little ammonia has been added. Take now two parts of solution of potash, and, having saturated one part with sulphuretted hydrogen, mix it with the other part. Add

sufficient of this solution to decompose the argentic precipitate, heat the mixture gently, and filter from the insoluble sulphide. To the filtrate add sufficient hydrochloric acid to produce a slight but distinctly acid reaction, boil off the sulphuretted hydrogen, and, on cooling, uric acid mixed more or less with cyanuric acid with very little colouring matter, will be deposited. The presence of uric acid at this stage is shown very distinctly by the murexide test.

COAGULATION OF BLOOD UNDER OIL.

IN the present day there is nothing so much wanted as a scholarly knowledge of medicine. Our literature is filled with vain repetitions. Men get an idea or observe a something, which to them is new, and out they come with it as if it were new to all the world. The experiment of treating newly-drawn blood, in order to delay coagulation, by placing the blood under oil, is one of these supposed new experiments, about which there have been put forth claims both as to origin and results which the slightest historical industry might have saved. The experiment of receiving blood under oil to retard coagulation and putrefaction was performed fifty years ago by the late Dr. Benjamin Guy Babington. Babington immersed the head of a cock that was about to be killed under oil, and while the animal was in this position, had it decapitated; the blood which flowed sank to the bottom of the vessel under the oil without ever coming into contact with air. There followed from this retardation in the process of coagulation, and in some instances—for the observation was repeated—what seemed to be the formation of a buffy coat. I myself followed up the same inquiry in a

rather different form. In one instance I received blood fresh from the neck of a sheep under sperm oil, and in another instance direct from a vein. I also received blood direct from a vein under oil into a bent tube at a temperature below freezing-point. The results recorded in the Astley Cooper prize essay on the Coagulation of the Blood, pp. 209-211 (London: Churchill, 1858), were, that blood under oil, as Babington observed, has its coagulation retarded, and when it does coagulate forms a less firm clot than is natural,—a clot, in fact, broken and very soft, unless it afterwards be raised to a rather high temperature, say 100° Fahr. I never found a trace of buffy coat, but I did observe an appearance from the oil which at first looked like one. I never found arrest of putrefaction under oil for any considerable time, although the commencement of putrefaction was somewhat retarded. Since the experiments published in 1858 I have placed both blood and soft animal tissues under oil containing 5 per cent. of ammonia, and have noticed remarkable preservative effects with continuance of fluidity in the case of blood. Here, however, the ammonia, not the oil, played the active part, the oil being merely a good menstruum. I think it probable that freshly-drawn blood might be kept ready for transfusion in this way, if the demands for it, in the practice of transfusion, were sufficient.

MEDICAL TEACHING IN LONDON.

HE *New York Medical Journal* of February 13th, 1886, in a long article upon "Medical Education in London; its Defects and their Remedies," re-echoes precisely the facts set forth in ASCLEPIAD, vol. i., pp. 36-77, for 1884.

The writer has studied with care the whole subject, and with a good knowledge of the valuable work of the old and free competing schools of the past, he recommends with telling ability a return to the old system as the one and only remedy for retaining for the Metropolis any shadow of reputation as a training ground for the future representatives of advanced medical learning and practice. On one point alone do I differ from this author, and that possibly is not a strong point on his part. He suggests that some of the present hospital school buildings should, under the independent system, be retained for school purposes. In my opinion this would frustrate the whole project. To make the independent system complete the schools should have no connection whatever with any hospital. They and the hospitals should be entirely apart and free; then teachers in hospitals would be as free as teachers in schools, the students would, if they liked, get the benefit of all the hospitals, and the best men in every department would compete with each other.

The idea is too good to be hoped for for a long time to come, and how it is to commence it is hard to say, unless the legislature can be induced to interfere, and by a resolute policy for the public welfare determine to break through all vested interests, and allow medical teaching to have its free and only natural course.

April
25th,



1886.



ON ALCOHOLIC ASTHENIA OF THE HEART,
AND ON THE USE OF ALCOHOL FOR
FEEBLENESS OF THE CIRCULATION.

CHAPTER I.

SUBJECTS OF ALCOHOLIC ASTHENIA.

F the many universal errors respecting wine and other alcoholic liquors, which have shaped themselves into practical truths, the one which has the firmest hold is the belief that whenever the circulation of the blood is slow or imperfect, whenever the heart, as it is said, is wanting power, whenever the pulse is feeble, then an alcoholic stimulant is necessary. There are thousands of persons who, with the best desires for the freedom of the world from alcoholic vice, are of this opinion. They say that it is an opinion they cannot avoid; they see the reasons for it too often to entertain any doubt about it, and very often the reasons are felt as well as seen.

There are many sayings and sentences which give character and weight to this opinion. "Wine is the milk of old age." "Give strong drink to him that is about to perish." "Wine prevents the circulation and the vital powers from *running down*." "A fillip is

wanted for an emergency." "Wine maketh glad the heart of man." These and other sayings, bearing a similar meaning, are ever being uttered in support of the idea that wine and its allies are necessary for the support of the heart and the circulation.

For my own part, I have no kind of prejudice on this matter. To me the phenomena of life present themselves so entirely in the experimental form, I can harbour no prejudice, can find no time to encourage one. I look for evidence, and having found that, in nature, am led by it. But this is not prejudice ; it merely leads to difference of view from the common ideas, in that it rests on a little industry or research respecting natural phenomena beyond the ordinary custom of accepting things as they are, and of believing certain statements because they are declared in regular routine of daily conversation.

In this very plain and straight course of study of the question now before us I cannot do better than open by admitting that the views entertained and expressed by many on the value of wine and other drinks of the same class are the true and forcible expressions of those from whom we receive them. They are the natural utterances of those who state them, and he is no correct observer who entertains any doubt whatever on this point ; it were, indeed, an insult to common belief to hold the doubt, expressed or concealed.

Patients have often come to me bearing, as they feel, the sting of such insult ; as if, say they, they did not know their own sensations, or as if they were telling what they knew was not the truth. Some hard-and-fast abstaining friend or relative has heard what they have to tell, and has laughed at them, or has received their complaint as a tissue of nonsense, or has sneered

at their want of resolution: but, "if the critic only knew what a glass of wine did; how it raised the languid powers, gave confidence to the wavering mind; did, for a time, make glad the heart; the critic would be less severe and more reasonable."

The statement of the line of argument thus supplied is the natural interpretation of all the difficulty. It explains that there are two classes of reasoners, each standing on his or her own ground, and deciding on his or her own conceptions. There are two sets of witnesses. Why?

The answer is as simple as it is direct and obvious. There are two sets of witnesses, because there are two sets of people: one that has become habituated to alcohol, and one that has lost all habit for it or has never acquired the habit. All through it is habit that is expressing itself; the alcoholic and the abstaining habit is speaking in turn, and each is, in its way, true and natural. The alcoholic habit speaks what it feels with sentiment of the keenest kind. The abstaining habit expresses its wonder that such sentiment can have any hold on any rational being; it wants no "milk of old age;" it does not call for strong drink "to save it from perishing," for it does not know the perishing sensation; it has no idea of what is meant by "running down" or "requiring a fillip," or the need of a stimulant to make "the heart glad." Alcohol plays, in fact, a part like that of a friend whom one person knows and trusts, and another does not. The person to whom alcohol plays the friendly part speaks of its virtues and aids. The person for whom alcohol plays no part says, he does not want such friendship. He can get on without it; he has no call for it.

A third and neutral observer listening to the debate

of these disputants might consider that, while the alcoholic habit was over-sentimental and not peculiarly strong, the abstaining habit was hard and unreasonable, or at best over-reasonable. Why should the abstainer slight the aid which the kindly alcohol so kindly proffers? Is life so easy that no living being ever requires to be supplied with a support or a fillip? Is life so happy that no human being can ever want a something that will make the heart glad? Surely not! Why, then, refuse the aid that the alcoholic habit so warmly praises?

In the answer to this question we have the whole difficulty of the contention concentrated, and the answer itself is by no means difficult. It is that there are before us in evidence two distinct classes of persons offering the evidence. The class that speaks in favour of alcohol knows from its own experience the effects of the thing; the class that speaks against it knows nothing about its effects from its own experience, and, therefore, as readily doubts them as the other praises them. In plain words, alcohol in those who from experience praise it, has made out its own case to their satisfaction; and the more they praise it, and the more they declare for it, as a necessity, the more loudly the thing itself is proclaiming itself through them. They have, by habit, acquired a second nature. Born with a common nature, they have, so it seems to them, enriched it with another. But those who from experience disclaim and denounce alcohol have retained the single common nature, and being thus constituted, and able to get on, as they are, to their hearts' content, they look on the new or acquired nature derived from alcohol as a foolish nature, superimposed by a tyrant of folly upon his deceived.

To the physician more than to any other member of

the community this view respecting alcohol is presented most strongly. To him those come who suspect, ever and anon, that their second or acquired nature is not quite so satisfactory an addition as it might be. They know that it leads them astray, handicaps them in the race of life, and makes itself too pronounced as a necessity. They try to tell what they know against it. They fail. They condemn it with an everlasting story of fears and apologies. The agent that has implanted the second nature speaks by and through them. Their tone of voice, their mode of argument, their half apologies as they dwell upon it, sing its praises, or descant on its occasional usefulness,—all convey that they do not trust it.

The men of the abstaining habit come with no promptings from alcohol, and so they can offer no testimony from personal knowledge of its virtues. They judge by what they see in others, not by what they feel; and, as most people express what is most liked from what is most felt, they have nothing in praise of alcoholic feelings, and alcoholic supremacy. On the contrary, looking on at the effects of an agent which has to them no personal worth, and seeing the outside evil which it inflicts, they go wroth with it, and pronounce anathema upon it with unsparing voice and pen.

With the evidences of facts before him, the man who will observe for himself will soon read the reasons for the praises and the dispraises of wine and alcoholic drinks which, in these days, he must, of necessity, listen to; and the lesson of a medical and scientific kind which he must gather is, that when he hears the praises of wine, he hears the influence of wine itself speaking through the person whom it has

inspired. He is listening to a trained and eloquently prompted advocate. It is not a man in a natural state who is elevating the alcoholic fluid to the rank of a benefactor, but one who is reflecting the virtues of a thing that has made or produced the evils it has helped for a time to relieve; and, as a rule, the more earnest the protest in favour of the thing, the more certain is the hold which the thing maintains on the protester.

To this rule I, with unusual opportunities for observation, have seen no exception. Whenever a person is speaking earnestly in favour of alcoholic drinks as the result of his or her direct experience of the value of such drinks; whenever a person says he finds wine to be absolutely necessary to meet such and such a case,—anxiety, fear, indecision, or emergency,—I know that the expression means danger; means, if the speaker be in earnest, that he of all men should renounce the agent that is so fair to his sensations, so false to his organic stability. I know that alcohol has there set its seal on the constitution, and that its eloquent advocate is one of those veritable brands of alcoholic type who will as certainly go from bad to worse, if he persist in his course, as that the seasons of the year will progress in their regular round.

The transition is natural. The effect of alcohol is to bring about, on a fixed and certain plan, what we are bound to call degeneration. Changes of tissue, commencing probably in the nervous tissues and in the peripheral lines of that tissue, extend to the nervous centres, and, by the paralysing action set up, overcome the will on the one hand, and the nutrition of the organic parts on the other, until the whole system, mental and physical, is alcohol-logged; dropsy of

alcohol, followed, not uncommonly, by the better known dropsy of water, from arrest, more or less complete, of the function of great eliminative organs like the kidney and liver.

The praises of wine and other alcoholic fluids are purely artificial. In a community that is free of the influence of these fluids the praise cannot be sung, because the need for the praise is unknown. The abstainer has nothing to thank alcohol for, and, consequently, gives to it no thanks. Everything connected with the use and praise of the thing is artificial, and has no place in the healthy nature. In the whole range of the living creation alcohol has no place until we reach man, and amongst the worlds of man himself its place is limited and definite. The alcoholic world is a world *sui generis*. It stands out before the physician as a phenomenon which he must learn and meet and treat.

In the presence of this great and puzzling phenomenon of life, dividing, as it does, into an infinite of minor phenomena, the physician has before him two distinctive lines of treatment, the preventive and the curative. He has, I earnestly submit, always before him the preventive duty. He has to endeavour to stop the entrance of evil. But he has also to endeavour to arrest or to cure the evil that may have become implanted; to meet feelings and arguments which are not sound, but which are none the less forcible, because they have, in the course of time, been bred, if not born, in those who experience and express them.

When the experience or sentiment of the sustaining power of alcohol on the heart and circulation has been firmly implanted, and when from the serious experience of the recipient it is strongly affirmed, danger as to the

physical condition of the person afflicted is certainly present. A faint heart, that can be systematically restored by resort to alcohol, is a diseased heart. Of that I am as certain as I am of the existence of the heart itself as a piece of the animal mechanism. The treatment of alcoholic disease begins more frequently at this stage than at any other. The sense of the vital want is the primary symptom of the vital intoxication. The heart, which always receives the first charge of blood it serves out, is, as a matter of physical necessity, the first to feel any change in the blood supply; the first to fail when the influence of the stimulant has been withdrawn; the first to rally under the stimulant resupplied. For this reason the person who depends upon alcohol experiences what is ordinarily called "sinking at the heart" after a short time of absence from the stimulant, followed by what is so commonly called "pulling up," that is to say, revival of heart-power, when a new dose of stimulant has been received into the body.

The classes of cases in which the phenomenon of alcoholic feebleness of the heart and circulation is represented are many. They have for their origin one cause, but they vary in character according to the external surroundings or accompanying conditions. Let me offer some distinctive examples which have come under my own observation.

I.

Mothers who are nursing their infants from the breast are often striking examples of alcoholic failure of the heart. In the position in which the woman is placed as the nursing mother, the circumstances are all favourable to the development of the disease. The woman is suffering a daily privation which can only be

met by an excessive taxation on her bodily powers. She has to supply two systems with food, without any additional organisation for meeting the demand. Her digestive system, her circulatory system, her nervous system, remain unchanged in respect to vital capacity for work, but they must all give extra labour towards meeting the new and steady want. Naturally the nursing mother ought to meet the strain by doing less work than before, by taking abundant rest, and by living on a carefully-selected and sufficient diet. If she can carry out such a mode of life, she goes on well, and as she is not, during the time of nursing, subjected to menstrual loss and perturbation, she passes through the ordeal safely and soundly.

Unfortunately, in too many instances, in the wear and tear of an exacting life, the nursing mother is not able to live according to natural laws. She has to work too hard, or she takes too much pleasure, or she sleeps too little, or she consumes too small a quantity of food, or she partakes of food that is not of good quality, or she lives amidst too much excitement. In short, there is scarcely ever a single example of a mother in these days of inverted pyramidal civilisation, nursing her infant in a form that accords with the natural plan, design, and necessity conducing most to the health of herself or of her offspring. The life, it is declared, is too artificial to be sustainable without recourse to artificial means of sustainment.

Under these untoward conditions, and guided by a false habit which a few years ago was all but universal, the nursing woman seeks for artificial aid from some alcoholic drink. Her digestion is bad, or she has been too long without food, or she has been engaged in some occupation that has called largely upon her physical

powers, or she has suffered from excitement or depression of mind, and she feels that she must be immediately supplied with food or drink to avert actual collapse. She knows that a good meal would do all she wants if she could take it; but it is not at hand, or she has no appetite for it, or if she did take it it is too slowly digested to fill the gap straight-away. But an alcoholic stimulant does the trick at once; a glass or two of port wine with a finger biscuit; a glass of stout with a biscuit or a piece of bread and butter; and, the vital powers are at work again: the woman is fed and the infant finds from her its needs.

The temptation to renew this experiment is soon irresistible, and as it seems to the uninformed, more than pardonable, nay necessary. Why make new and troublesome plans, why hesitate and grow faint, why keep the child crying for nourishment, when the instant remedy is at hand?

In proportion to the apparent benefit derived from the alcohol, the real evil is displayed. A certain amount of water which is required at once for the blood is at once supplied; a certain glow or warmth communicated to the stomach is comforting and deceiving; a certain quickness and rapidity in the action of the heart, which is soon set up, causes the nervous centres to be charged with blood, and is more deceiving still; while a certain free flow of milk, which seems to supply all that can be desired, completes the deception. From the beginning to the end of the process nothing in the way of food has been yielded by the alcoholic solution except the water which carried the alcohol, and a modicum of sugar and other solid material of food, which set out on a dish for a meal would be an insult to the poorest appetite. But all through there has

been a physical-chemical change; an excitement which has wasted while it has excited; which has made the heart do a fourth more of work; which, in the end, has yielded no foundation, no structure for flesh and blood; no material for the animal heat; and which only too rapidly has declared, in the quick desire for repetition, that out of nothing comes nothing, and that ashes will not feed the animal fire.

The consequences of this mode of treatment, often repeated, cannot fail to lead to permanent organic failure of the heart and circulation. The inevitable danger may be averted or lessened by the course usually recommended, when the induced exhaustion is serious, that the nursing shall be stopped. Yet often that advice is too late. The sentiment has become physically implanted that the alcohol is a necessity; and, the disease induced, sustained by what it feeds on, is confirmed into fatal significance.

II.

I adduce the example of the nursing woman first, because it is the most steady and common of examples, not because it is exceptional. The same examples may be found amongst men who are daily tired by engrossing and exacting labours which bring into wearing play the mental as well as the physical powers.

At one time men who were subjected to extremes of physical exertion were wont to depend on stimulants for the carrying out of great effects. Now by the introduction of fair and measurable competition in the field, on the race-course, at the shooting butt, on the river, the egregious blunder has been corrected by the common and unquestionable observation that in all trials of strength and physical skill, depending on the

heart, those who avoid the treacherous aid of stimulants are the safest and surest conquerors. The proof has still to extend to the other classes of men, to those who are engaged in mental work accompanied with much worry, or much responsibility, or much care.

Persons in active commercial business are easily brought under alcoholic failure of heart from false dependence on alcohol. They are so busy or so absorbed in business pursuits, they forget their regular meals, or, what is equally bad, they are too much hurried and pressed to find the time for digestion. In emergency, as a matter of expediency, they take some light thing of food, a biscuit, a crust, a sandwich with a glass or two of wine or other equivalent alcoholic stimulant. They feel for a moment refreshed and ready for business. They repeat the dose as occasion seems to demand, omitting too often the food; and at length trusting, by habit, to the wine alone, they resort to it for ready and instant support. As one of my own medical brethren explained the matter to me from his own personal experience, "I can get all I want from a meal when I have time for digestion; but as I can get, temporarily, the same from wine and save the time, I take wine and accept the consequences." The admission was as candid as it was exact. Yet I noticed, by comparison, in my own case, that, taking the time for the digestion, I could, in the long run, get through as much work as my friend, and more varied.

Other classes of men who depend on alcohol until it reduces the action of the heart are those who have regularly to strive against time, and especially men who have to work in that way at and through the night. In the work against time there is always extra exhaustion, for the simple and natural reason that under such

circumstances there are two sources of waste, two expenses of energy, in steady progress. There is the work being done, and the fear or desire arising from the necessity that the work must be done. The one expenditure is employed in impelling the other, and the one seems to back up the other in inducing the desire for stimulating drink. The glass of wine or spirit appears to quicken, and for an instant, no doubt, does quicken, the labour. The ideas flow rapidly; they flag; the stimulant is repeated, a better flow follows in quick response, and under this constantly-renewed spurt the work is done. The exhaustion which succeeds may be so extreme as to exclude all hope of perfect rest from sleep, for jaded nerves never sleep well; but the work is finished, and the end, it is thought, justifies the means.

III.

There is a third class of men who fall into the same habit of accepting alcohol as if it were food, and are defrauded by it; I mean men who live on what is called excitement. These persons are, by their mode of life, thrown into scenes which subject them to persistent variation of hope, suspense, fear, disappointment, delight. They are engaged in some speculative calling,—the betting ring, the commercial ring, the political arena, the game of chance. Or, they live by the applause of the multitude, on the stage, or in some other position which brings them prominently before the public. The strain on the nervous and muscular systems of these actors, for such they all are, is often terrific, and the want of something to keep them rapidly going is, to their minds, constantly imminent. The alcohol, always at hand, is the one thing only that they require for emergencies. They get into the habit of resorting

to it, and into the fixed belief that without it they are helpless. There are no persons more difficult to reason with on the surreptitious action of alcohol, to whom wine is the mocker.

IV.

Not to enter into too much detail on the classes of the deceived, there is one more which must be noticed. I refer to the class of men and women who take a stimulant on the honestly confessed principle that they "take it because they like it." To these it is an indulgence, and their reason, as a reason affecting themselves, is unanswerable. They feel effects from the draught of wine or spirits so truly pleasurable, they have become so habituated to the pleasurable sensation, that to them it is a second nature. To them wine is not merely the thing most required; it is, to their ideas, the choicest sustenance. To argue with them is in vain. If you offer yourself as a living illustration of the fact that life, and active life and enjoyable life, is easily supportable without the fictitious supporter, they pity you and wonder, but they are no more convinced than if you told them that you had discovered a mode of living without any food or any drink.

In all these classes, nevertheless, as well as in others which I have not particularised, but on whom the alcoholic tax on the heart has been levied, there is the common and frequent danger, that under the repeated influence of the alcoholic fluid the heart shall become enfeebled, and, the enfeeblement started, that it shall be intensified, by a deeper trust on the agent which has led to its development. For a short life and a merry one, alcohol is a wishing talisman that rarely fails to prove itself a success.

CHAPTER II.

SYMPTOMS OF ALCOHOLIC ASTHENIA.

THE symptoms of failure of the heart from alcohol, in whatever class of cases they may occur, are all but uniform, and are so characteristic that none who observe and study them, with care and without bias, can fail to recognise them. The most marked feature of them is, emphatically, failure. The subjective symptoms signify failure; the objective, taken as a whole, also signify failure.

Dealing first with the symptoms which are subjective, the patient says, in describing what is felt, that there is a sensation of depression or sinking at frequent periods, which depression, until very late in the history of the disease, is relieved by a stimulant. At first the depression may be referred to the stomach, and in some it is always felt there when it first commences. In a short time it extends to the chest and heart, and is most commonly defined as a sinking at the heart, accompanied by physical feebleness in the chest, which seems to be relieved by bending the body forward, and which is always relieved by getting more support for the body, as by leaning forward on a chair, a table, or a stick. I once heard the feebleness very correctly described by a patient as "an inability to stand firmly and perfectly upright." The expression is true. The shoulders are thrown forward, and there is a disposition to stoop until the restoration to equilibrium is obtained. Briefly, we may say that the subjective symptoms are like those which follow want of food or nourishment; but too frequently repeated: the desire is for "little and often."

These are the subjective signs of an early stage. In a stage of further progress the sensation of failure is quickened, and at the same time intensified. The area of exhaustion is extended. The sinking at the stomach and chest is soon succeeded by a sense of lightness of the head, attended by nausea and giddiness, with subsequent coldness, faintness, and a desire for the coveted stimulant which food does not pacify, and which is most difficult to restrain.

In a third, and still more advanced stage, the symptoms of exhaustion are yet more frequent and severe. Any little additional demand upon the vital powers is a sufficient reason for their development, and the will to resist the stimulant is feebler than ever. In this stage there is manifest failure of muscular strength, and uncertainty of muscular precision. There is equal uncertainty of mind and failure of judgment.

In the last, and what may be called fatal stage of the alcoholic asthenia the subjective symptoms are those of complete physical and mental collapse—"sans heart, sans will, sans mind, sans everything." In this stage even the stimulant fails to revivify: it makes things worse, and lets down still lower the enfeebled life.

The objective symptoms are as decisive as the subjective, and present as many stages when they are carefully looked for; but as the physician is rarely called upon to observe them until they have reached the second, or more frequently the third, stage, they are less known than those of later development. The patient is his own physician in the first and second stages. He thinks he is acquainted with what suits him, or, as he explains, he thinks "he knows his own constitution;" and this lasts up to the point when, in spite of such knowledge and in spite of the action he

takes in relation to it, he cannot get on without some further advice. Here, therefore, in the later stages, the objective evidence comes under skilled observation.

The objective evidence now presented is from both the physical and mental sides. There are the usual symptoms of what we call the alcoholic dyspepsia. There is cardiac irregularity of tone and of time. The pulse is at one moment feeble, yielding to the sphygmograph a tracing of one and a half to two and a half degrees of impulse at most. At another moment, after a new dose of alcohol has been swallowed, it is sharp and bounding, yielding, at this period, an impulse tracing of seven to eight degrees, with an acute angular return stroke and a descending trace reaching nearly to the base of the ascending, with very short intervening checks and a distance of less than half the natural space between each impulse. At yet another period, when the influence of the intoxicant has been long withdrawn, there is a "rotten pulse" in the full sense of that characteristic term. To the finger it is feeble and irregular. To the sphygmograph it affords a tracing simply abortive in all its details. The impulse trace is not more than two degrees; the first return or falling trace is down to the level of the base of the impulse: the intermediate events are scarcely recorded, and the irregularity of tension is such that it is impossible to fix on any one base line as the origin of the tracings or the foundation of the series of events. The pulse, like the mind, is uncertain and unsound.

The temperature of the body in persons who suffer from alcoholic failure of the heart is variable. Immediately after the reception of the full dose of the stimulant the temperature runs into fever heat. I have seen it up to 104° Fahr. As the effect of the alcohol

declines, the temperature rapidly falls, and one of the worst signs of degradation from alcohol is the coldness of the body under deprivation. The hand of the sufferer is so cold that the moisture exhaled by the skin condenses on the skin, as it does after the hectic of consumption, so that the skin not only feels cold, but also moist and clammy. The moisture does not trickle from the skin, however, as in true colliquative sweating, but conveys to the touch the idea of a cold and sodden surface like dough. In this condition the reduction of temperature may be as low as four degrees beneath the natural standard. So great is the fluctuation, indeed, in these cases, that I am writing with the particulars of one such case now before me, in which, from day to day, the temperature had a range of from 96° to 102° of Fahrenheit's scale.

The mental phenomena are most distinctive in alcoholic asthenia of the heart. As the circulation varies, the mind varies. As the gas light flickers and changes when the pressure is variable at the main; at one minute flaring away with noise, heat, and bluster; in a little failing to a mere point, so that there is fear that it may go out altogether; and in another period burning with fair steadiness but no persistent certainty; so, that light of life, the mind of the person who is suffering from alcoholic asthenia of the central organ of the circulation, blusters, ebbs, flickers, and varies as the pressure of the blood varies and determines the effects. At one moment the mind is vehement and inconclusive; at another it is so feeble that it can determine on nothing definitely. Again, for a season, it assumes some degree of order; but at its best it is uncertain, ever hoping against hope, and striving against strife, towards despair or imbecile fatuity.

Meanwhile in many instances some other vital organ, besides the brain,—the lung, the liver, the kidney,—follows the brain in injury; and that universal degeneration in which all parts are involved in the destruction, receives its full and fatal development.

In the above descriptions I have written the life history of many who are openly and admittedly inebriates. But not all who thus suffer are of the open inebriate type. I frequently am consulted by sufferers from true alcoholic asthenia of the heart who are not only unsuspected of inebriety by others, but who do not suspect it themselves. They see persons who take more alcohol than they themselves take, and, therefore, they judge that they themselves are comparatively safe. They argue from some rare experience that a certain man they could name has far exceeded them, and still has reached to a length of life that is quite remarkable. Why, therefore, should they suffer from their more temperate indulgence?

On the whole, I have seen more cases of alcoholic asthenia of the heart in these unsuspected and unsuspecting people than in open and admitted inebriates.

One more symptom, which may be either subjectively or objectively declared, is a part of the history of alcoholic cardiac asthenia that must not be forgotten. In advanced stages of the asthenia sleep is perverted. In certain instances, not numerous, sleep is deep, prolonged, and so frequently repeated during the twenty-four hours as to become a matter of comment by observers. As an ordinary fact sleep is most imperfect during the asthenia. Usually, soon after the body has lain for an hour or two in a state of repose the process of "running down" is induced. The heart works, for a time, at low tension, and then comes almost

to a sudden stop ; upon which there is a hasty start from sleep, and no more sound sleep during the whole night. From this untoward circumstance the asthenia is increased, with further desire for the stimulant, until alcoholic insomnia is the added and crowning evil.

CHAPTER III.

TREATMENT OF ALCOHOLIC ASTHENIA.

THERE are no cases more difficult to treat in these days than those of alcoholic asthenia. I say "in these days," because in a past day, which I very well remember, there was no doubt, and, therefore, no difficulty on the subject. We were led to believe that alcohol was a necessity of life, that wine was a means of support, that in all cases of weakness it was proper to give a stimulant, and that, as a matter of course, the stimulant must be continued in the disease now under consideration. The point of practice was the adaptation of the quantity to be administered in the particular example of the disease that was under management. I do not recollect a single instance in which any success whatever followed this method of treatment ; neither do I see how any could follow, because there was no precision in method, no sound reason. We did not form any idea as to what quantity of alcohol was contained in the draught of wine, beer, and spirit that was prescribed, and we ordered, usually, a reduction of the amount which the patient himself told us he might be taking, a statement as worthless as it was speculative. Still, this was considered to be the right practice. We argued in these cases as we did in the treatment of delirium tremens, "Reduce the amount, but continue the cause of the disease."

Experience has now been obtained which rests on a sounder basis than the *experientia fallax* derived from authoritative and unquestioned dogma. We have learned the action of alcohol, and we have learned that so long as the influence of alcohol is maintained, there is no cure of alcoholic asthenia or failure of the heart. We have learned also, from direct and conclusive observation of fact, that the fear of danger from the instant withholding of alcohol in alcoholic asthenia is one of those delusions which has only to be tested to be completely demolished. No alcoholic gaol-bird has ever seriously suffered from immediate abstinence from the usual stimulant. Nor, according to my observation extending over a period of ten years, is there, in any case, anything worse than a temporary, and often nothing worse than a sentimental, deprivation.

The fact to which an unprejudiced reading of nature leads, irresistibly, may be embodied in the rule, that, *the greater the sense of failure of the heart from alcoholic debility, the more urgent is the necessity for absolute abstinence from alcohol*. In other words, the sensation of failure is the surest test, the most certain symptom that its cause should be removed instantly, resolutely, absolutely. I can say, most truthfully, that I have never seen a single recovery from alcoholic asthenia of the heart under any system of half measure or tampering with the enemy, even under the most guarded care.

I believe that this natural truth is now becoming, day by day, more completely recognised. Medical men are not merely recognising it from what they see amongst their patients, but in many instances from what they feel themselves in their own persons. One of them, who has lately sought my advice on his own case, told me

frankly that he traced the origin of his cardiac failure with as perfect clearness and certainty, as if he had been conducting a series of experiments on himself in order to write an essay on the subject. But until he came to me, he could not make up his mind to do anything more curative than pursue the hopeless task of endeavouring to cure himself by half measures. He told me another truth, which I have heard before, that the endeavour to cure by the half system rather increased than reduced the danger. When, under the sense of great lowness of power from the heart, a small dose of alcohol was taken, it did no more than tantalise, and led to nothing less than an intenser craving for a second and a sufficient dose. Thus a dose and a half would often have to take the place of what, under the old plan, was a single and efficient quantity, because the first dose, which did not relieve depression, added to the disturbance, and increased desire.

The first step, then, in the scientific treatment of alcoholic asthenia of the heart is to remove the cause.

A second point, to which attention is almost invariably drawn, relates to the use of so-called substitutes for alcohol. In my early attempts at treatment I trusted much to the method of finding a substitute, and, indeed, I think there are few discoverable combinations which I did not use. I have come leisurely and clearly to the conclusion that each and every one is a radical failure, physically and morally. Physically the so-called substitute, if it produce any effect at all, acts like alcohol itself. It is a substitution of one evil for another.

The moral failure of the substitute is as bad as the physical. The moment the necessity for a substitute is admitted, the necessity for alcohol is implied.

Then the patient loses confidence, and falls back on the original source of error.

A third advance is to get the patient to trust to the natural cure under proper regimen and diet. An immense deal turns here on gaining confidence. The physician cannot be too firm, too assuring, too persuasive. He encounters every possible obstacle; the prejudices of interfering friends who may know nothing about the danger in which the patient stands; the difficulties of social life,—hospitalities; the fear of the patient that the fact of his abstinence shall be misconstrued into the suspicion that he has been a secret drunkard or hard drinker. All these obstacles have to be met and they must be met. The patient must be persuaded not to listen to such false leading. He must be induced to forget alcohol altogether.

A fourth rule of practice relates to diet and regimen. The lesson must here be enforced at once that no more food is required under abstinence than under the use of alcohol. If the patient entertains the insane delusion that because he abjures alcohol he must take more food, the first bad event will be a fit of indigestion from over-eating, a fit of melancholy, and the strongest desire to return to the stimulant. It is well perhaps to take a shorter interval between meals during the early times of abstinence, but the meals can scarcely be too light. The instant the stomach seems to be satisfied, the sign "enough" has been given. For immediate depression a draught of hot milk and water,—equal parts of the two fluids with a little sugar,—affords the best support, and for a drink at meal times this is also a very good mixture. Grapes and fresh fruits generally are good adjuncts to breakfast as well as

dinner, and a leaning towards a vegetable diet is a decided benefit.

Two luxuries I strongly advise all sufferers from alcoholic failure of the heart particularly to avoid, as they are learning to conquer the craving for the enemy. These are tea and tobacco. The number of relapses which I have seen brought about by these two agencies, tea and tobacco, are so many, I almost despair of success so long as they are persistently used. They both depress the circulation and make the craving for alcohol extremely severe. Coffee is less objectionable, but it often produces flatulency and indigestion. Cocoa is, as a rule, very suitable, but milk and water, with, as a change, a little fresh lemonade, or a mixture of water and fruit lime juice, meet the question of drinks thoroughly well. Very soon the abstainer from alcohol drinks less fluid of every kind. From fifty to eighty ounces of fluid a day under alcohol, he comes down to thirty or forty, is satisfied with water pure and simple, and is lighter and better for the change.

One rule remains. It is absolutely necessary, in order to ensure a good recovery from alcoholic asthenia of the heart, for the sufferer to get plenty of wholesome rest at night. Early to bed is the last prescription in this essay, and in some senses the best. To bed before eleven at night and rest of heart in recumbency to seven the next morning is the order. Let this rule supplement the rules which have gone before, and of the many who suffer from failure of the heart from alcoholic drinks, there are none that will not be benefited, and few that will not be cured; assuming always that the devil of degeneration has not produced fatal transmutation of vital organic structures.

THE SKELETON IN THE NATIONAL CUPBOARD.

IN the past three months we have heard in this mighty London of little else than three great series of events.—The Irish Question.—The Indian-Colonial Exhibition.—The Glut of Luxury.

These three events, casting all others into the shade, have each their solemn meaning. One will say that the Irish Question stands first in importance, as touching the vital point of the continuance or the break-up of the British Empire. Another will say that the Indian-Colonial demonstration stands first, as evidence of the possibility of forming a great Imperial federation. I venture humbly to suggest that the most vital point of all, that which affects nearest the very vitals of the nation, is the grandly-fearful spectacle of the eternal Belshazzarian table, that has been outspread so portentously and demonstratively.

I am no pessimist; but, as a physician, I stand appalled at the insanity of luxury it has been my fate to witness, by the side of the awful destitution to which the luxury is bound hand and foot in common peril. Knowing, as we are forced to know, that the national

stomach is the centre of all national power, and that the fable of the belly and the members is as true to-day as it was the day it was written, all fears of Irish rule for Ireland, all hopes of Colonial combinations,—blessed as such hopes are for a day far in the future,—seem trifling matters compared with that skeleton of want which in the midst of the national feastings haunts the national cupboard, and is the most grievous sight in the national organisation.

A foreigner in this country, looking on at our feastings, and not looking at our immediate and available resources, would suppose that we, a people living practically in a citadel, had in store a year's supply of food at least. If he were told that we were really living from hand to mouth, week by week, he would think that some supreme joke was being tried on him. He could not grasp the anomaly.

I do not mean to indicate, by this suggestion, that the hand-to-mouth system in England is so close that it is bounded by the limit of seven days. There are some gloomy prophets, having a good knowledge of the food market, who think that this is actually the fact, and it cannot be ignored that there are seasons when this sad foreboding looks too near the truth to be comfortable. That sad view is extreme. If all England could be surrounded to-morrow by hostile forces so that communication from the outer world were entirely cut off, she would not, perhaps, begin actually to starve, even under those desperate circumstances, in seven days at any season of the year. But under less than such a pressure, she would in a short time be convulsed politically, not from actual deficiency of supply, but from the difference of ability on the part of consumers to lay by stores of supply. Under slight pressure, a sharp

demand, a panic, the few rich would, practically, buy up the multitudinous poor, and then, when the multitude hungered, or even fancied it hungered, the crash would come.

We know that in the grand scheme of Nature the principle of life is self-containing and self-supporting. We know that nothing in nature, not a crumb that falls from the rich man's table, is lost even as food. We conceive that the amount of life on the earth is always the same; that death balances life, life death; that the animal life is always safe while the vegetable life is maintained; and that the vegetable life is always safe while the inorganic elements and the forces which move them are maintained. At the same time, no one who reflects at all can fail to detect the danger which exists in individual communities, while life itself is at war against itself, and while one sphere of life is dependent on the temper of the other. The earth is the mother of men, and her motherhood is beneficent beyond all wants in the way of gifts to her children. But the children must agree to share her gifts fairly, and with mutual consideration at best, in order that all may so much as live. Shared unequally and savagely, some must die of want. Shared with moderate equality and with common friendship, none who are within reach of the common brotherhood need die of want anywhere, neither in the coldest nor most unfruitful season, except by accident or self-abandonment of life.

The "political forecaster has, however, to consider things not as they might be, but as they are, and as they may be seen; in which light one sphere of life is dependent on the temper of the other. To this little issue, resting on human passions, do the divinely comprehensive schemes of the Universe itself stand, at

the present era, in their relation to mankind. The will of man so overrules all else, that natural designs, great of greatest of their kind, may be governed even by savage intellectual concourse. In brief, to come humanly into harmony with the natural law which universally feeds life, it is necessary for man to go through a passage of universal intellectual growth, that shall equalise the instincts of humanity for the food on which humanity may live.

And while this should be admitted, there is yet another and difficult truth running parallel with it that is not to be set aside. In human communities, the vital parts of which they are composed are in states of trembling equilibrium, easily changed and reconstructed. Like the saline particles of a solution saturated by a salt, the living parts may remain in one form and mobile for almost an unlimited time ; but the merest concussion, like a speck of dust in the saline solution, may cause these living parts, without losing their structural essence, to strike out into new combinations which remain permanent until some other external potent influence interferes to resolve and to reconstruct once more.

In England, at this moment, if there is one more potent influence than another that would add to sudden reconstruction of her political elements, it would be the concussion of panic from a sudden deficiency of food supplies. And, as that panic need not be determined by a great deficiency, nor even by more than a mere urgent dread of a deficiency, it will be seen how momentous a subject is included in the cultivation and importation of food supplies, the husbanding of such supplies, and the application of such supplies after they have been produced or procured, and husbanded.

CULTIVATION.

Under the head of cultivation we have to consider how far by cultivation, with economy, husbandry, and skill, we can prevent the necessity of importing food for the healthy maintenance of the people of these islands. There are many persons who maintain the utter impossibility of this effort, and of late years it has been rare to find any one of authority who has admitted its utility. Public opinion seems to be grounded in the belief that we must now depend on other nations for food, and no doubt at the present moment from two to three days' supplies in each week are demanded. The reason why this necessity is insisted on rests largely on the old argument of freedom in respect to the corn laws. When we were, by self-imposition, forced to depend mainly on our own produce, the pinch that was felt led so near to revolution that the dread of the catastrophe has left a deep mark or scar on the national mind. We feel under no pressure now of a self-imposed character; we draw from abroad as we want, and in America alone we find a source of cereal supply which baffles the computations of corn buyers themselves.

It is probably true that we may never again supply the whole of our community with food of home production, and as affairs now stand, with an increasing supply from our own colonies, we ought not perhaps to be anxious about making any experiment of too extreme a kind. Better, it will be said, better for us to send forth produce of other kinds which foreigners or colonists will accept to buy, and take their food in return.

Within certain limits this rule is sound. It is, at its best, a speculative rule, but on the law of probabilities, it is sound provided it be not trespassed on too far. The

danger lies in trespassing on it beyond what it will bear, and of becoming careless of possible home resources, under the idea that, as the foreign supply is absolutely certain, the home cultivation may be neglected, and the labour necessary for such cultivation may be more profitably directed to other purposes. The moment we come to that conclusion, that moment our speculation becomes a national danger. It is letting land lie waste without intent; it is giving up cultivation without effort; it is destroying us as a thrifty agricultural people.

Worse than all, the transference of our industry from cultivation of land for food into the cultivation of arts for artificial and foreign wants, tends to lead us away from the natural basis of all industry. These artificial products which the art of man gives to us are at all times fluctuating dependencies. When hand weaving was superseded by machine weaving, an industry was changed; but there is no reason why the machine craft weaving should remain for ever any more than the hand craft. Some new advance of science and art may change all such mechanical industry, and great factories may in time become as empty and dead as some of the mines of Cornwall now are. It were, therefore, an effort simply ruinous to put the agricultural work and skill of this kingdom one peg below the full value of what it may or might be brought to. Our effort and our natural duty should be to rest on our natural basis, and to support ourselves for as many days in every week as we can on natural grown sustenance. No skilful general ever willingly leaves the basis of his supplies even to the most hopeful chance.

There are two reasons for this effort, one depending on the necessities of the countries which at present

send us their overplus, the other on the effect of trade influences on the sale of imported foods within our land after they reach it. Let me illustrate what I mean by one series of facts.

There came over from Australia a cargo of preserved fresh meat in a vessel called the *Strathaven*. I was amongst the privileged to witness the results of that remarkable experiment, by which it was for the first time proved to demonstration that animal substance could be brought from the Antipodes to this country in the most perfect condition for the food of a flesh-eating community. Soon after its arrival in London I visited the *Strathaven*, I saw the carcasses of sheep and oxen unpacked from their ice-preserving chamber, I dined on some of the food so preserved, and I followed up some of the commercial details relating to the experiment.

The cargo, consisting of sheep and oxen, was bought in the colony at an average price of one penny halfpenny per pound. The cost of freight and the engineer's expenses reached twopence per pound. On landing, therefore, the cost of the meat was just threepence halfpenny per pound, beef and mutton being precisely of the same price, bought at the same price and preserved at the same in the colony. If the meat thus landed here had been sold wholesale at the rate of fivepence per pound, the shippers would have realised one penny halfpenny, which would have been to them, the market being certain at that price, a return, yielding, in fact, a profit of over twenty-five per cent., a sufficient realisation to satisfy commercial men in embarking largely in adventure. As it was, the beef was sold at fivepence and the mutton at fivepence halfpenny per pound wholesale. So far this result would seem, at the first sight, to be eminently satisfactory. It was esteemed

as such, and some of the organs of public opinion were, not unnaturally, elate at the success. We were told that beef and mutton would soon be sold in London at sevenpence and eightpence a pound, with a fine profit to the general as well as to the retail dealer.

The result was not so favourable. The two effects I have sketched out above came immediately into play. The effect of the new outlet for animal food from the colony was to raise the price to twopence in the pound there, a rise which would increase in proportion to further demand. The effect here was but to lower the selling price, comparatively; for as soon as the imported meat, sold in the market first hand at the Smithfield price of fivepence, passed into second hands, the Smithfield price became ninepence retail for the hind quarters and sevenpence for the fore quarters, the average Smithfield retail being eightpence. By a further movement in sale some of this meat sold in the West End of London at tenpence per pound.

In these facts we see at once the direction of movements that spring from importation of food: increase of price at point of supply; quick increase of price at place of destination; and this too in time of peace, when there was no undue pressure or panic. The lesson is full of meaning. It tells, beyond any theory, tells in the most practical manner, the necessity of fostering to the extreme our home cultivation, and of relying as little as possible on foreign resources. The time, in fact, has come when by a Royal Commission, or some other more convenient and scientific procedure, the whole subject of home cultivation ought to be brought forward by the Government, and such an agricultural survey instituted that the food value of every acre of land in the kingdom may be exactly known.

ECONOMY.

The next advancement in respect to food is the knowledge of economising and of husbanding the food which is either supplied by our own soil or sent to us from abroad. It is no wonder that we are short of foods when we consider the quantities that are wasted and are, as it were, literally thrown away. Mr. Gladstone once said, that the retail value of the beer sold in this kingdom was seventy-five millions a year. The late Mr. Hoyle estimated that the cost of all the intoxicating fluids used in the kingdom in one year was over one hundred and forty-two millions, a sum a little under the money value of the foods imported and used in the same period of time. Speaking of the national loss implied in the use of alcohol, Lord Derby has asserted that of every sixpence spent on alcoholic drinks fivepence was thrown away, and Lord Derby's estimate was below rather than above the mark. The little residue of food, the fraction of food that is present in the alcoholic drinks, really does not reach his calculation, inasmuch as the whole value lies in the water contained in those fluids and the small quantity of sugar and saline substances or earthy substances with which the water is impregnated; an infinitesimal for good as covering the poisonous alcohol, which levies, beyond its own cost, one hundred millions more of money in cost of crime, disease, and destitution.

I might, in many other ways, illustrate the point of economy of foods; but at the present moment this one point is all-enthraling. It is in vain for a family or a nation to attempt thrift in food while this wealth of food is thrown into the devouring sea of luxury.

HOUSEHOLD THRIFT.

There is, again, the grand, practical art of thrift, lying straight before us all ; the art of so applying food as to make it, as it comes to us, as useful as is possible, with as little waste as is possible, and with as much comfort as is possible. In carrying out this part of the design of thrift there are three advances to keep in mind.

The first of these advances is purely personal. It consists in taking care that in our own personal acts of taking food we do not over-supply our wants. It is, without any doubt, the fact that the majority of Englishmen of the present day take very much more food than is really good for them. By this process they inflict an evil on themselves and two evils on the community. On themselves they commit injury. They entail an unnecessary cost of living ; they overtax their own life powers ; they make their digestive organs the ministers of their pleasures as well as their necessities, and so bring those organs to an untimely end while yet the rest of the body might have and enjoy many years of life. On the community they inflict the injury of bad example of waste, which is of itself evil enough, while they inflict also the almost worse example of exciting discontent at what really is natural, and, therefore, very good. They make, in plain words, the luxury of feeding a cause of envy, and foster a spirit of revolt amongst the poor and simple against the, in this respect, unfortunate rich and luxurious. The poor man, rising from his own table, which may have supplied him with every necessary and, for the matter of that, every delicacy that a natural appetite and taste could require, and seeing the rich man's table spread out so much

more richly, may well exclaim :—"How wretched is the condition that gives me a bare meal at a cost of a miserable shilling or two, and that man a feast at a cost of two pounds!" The argument, naturally enough provoked, is an argument of the saddest sound. It conveys a thriftless example, by which the national taste is depraved, and improvidence made to stand as the grand object and end of existence.

A further advance in the art of thrift at home consists in turning, as far as possible, to the first sources of supply for food. This consideration brings us face to face with the system of feeding which is called vegetarianism. I am not a vegetarian, and I dislike the term as at once too rigid and too indefinite. We need not consider how to avoid living on such a purely animal and natural food as milk ; we need not learn to live on vegetables which contain more water than the seventy-five per cent. of water in legs of mutton and in other similar animal foods. But we really ought to consider the question of utilising, on a large scale, all vegetables which, in nutrient value, stand above animal products. We ought also to learn, as a first truth, the truth—that the oftener we go to the vegetable world for our food the oftener we also go to the first, and, therefore, to the cheapest source of supply. The commonly-accepted notion that when we eat animal flesh we are eating food at its prime source cannot be too speedily dissipated or too speedily replaced by the knowledge that there is no primitive form of food—albuminous, starchy, osseous—in the animal world itself, and that all the processes of catching an inferior animal, of breeding it, rearing it, keeping it, killing it, dressing it, and selling it, mean no more nor no less than additional expenditure, throughout, for bringing into what

we have been taught to consider an acceptable form of food the veritable food which the animal itself found, without any such preparation, in the vegetable world. With the light of these natural facts filling the national mind, the tendencies of all advanced scholars in thrift should be to find out plans for feeding all the community direct from the lap of earth; to endeavour to discover how the fruits of the earth may be immediately utilised as food; and to impress science into our service so that she, in her laboratories, may prepare the choicest viands, minus the necessity of making a lower animal the living laboratory for the sake of gratifying what is just a little higher than a cannibal propensity.

Still another advance, in home thrift, consists in taking care that in the use of food nothing be lost. In England the direct loss of food in the household is something incredible. If large numbers of Englishmen eat twice as much as is good for them, a great many more lose twice as much, the loss increasing as population condenses in great centres. At the time of the cotton famine I estimated, in respect to animal food, that the average amount to each person in England was seven and a half ounces, while in France it was under three ounces. This was by an estimate on these countries as a whole; but when the test was applied to the metropolitan centres of each country it gave a proportion of twenty-two ounces per person in London, and nine ounces in Paris.

These lessons of household thrift practised at home should be taught to the people by a grand public effort to supply them with public kitchens in which every element of economy could be seen and realised, and from which, at a cheap rate, every class of wholesome

food could be obtained. In the course of the present year I have met many working men, have heard their views, and have tried to explain their most reasonable ideas on this great and grave subject. But all effort falls on deaf ears. The skeleton in the national cupboard is not seen, and is, therefore, not dreaded. Luxury blinds as it fattens.

Yet there are some who without seeming to appreciate all the danger that lies in the near future, do foresee danger, and propose to meet it by temporary expediciencies.

It is held out by a section of these that the skeleton may be exorcised by a reduction of the family, by reduction in the numbers of the family by emigration. The chances of reduction of population numerically are not great, but the reduction of best power by emigration is a certain fact, so that in the strictest sense of the word men decay in this land by emigration. The fittest for work and for earning leave our shores. The unfittest for work, the luxurious, and the least powerful remain. Thus the drain on the first resources of permanent national prosperity is opened by emigration, and is exhausting the heart of the Commonwealth.

If the political doctor, like the professional doctor, could, without injury, remove from the body political under his care the useless or diseased part, the treatment might be sensible. But to cut away the healthy and leave the unhealthy is about as bad a specimen of political *mala praxis* as could be perpetrated by human perversity.

There are others who, guided by the kindest but most mistaken motives, think that the danger can be averted by turning the crumbs of the rich man's table into the wallet of the poor man. If these good-natured people only knew how the stomach of the masses revolts at

this insult they would see that their project would soon place them at the head of the revolutionary forces now in formation. A few relief carts of refuse from the tables of the great to the tables of the poor,—a wantonly thriftless teaching at best,—would be quite sufficient at this moment to excite unquenchable wrath amongst those for whose benefit the experiment was tried. I heard this project discussed by a large body of the thoughtful of the working community, and the quiet but deep indignation it provoked was something to be remembered. Are we dogs or men? was the indignant question.

The skeleton in our national cupboard, the panic of no food, is the worst skeleton that ever existed in any cupboard, national or domestic. The dynamitard skeleton is a baby skeleton in comparison. Perhaps our new Parliament, when it has settled the Irish Question, will discover the skeleton and will legislate for its expatriation:—by the utilisation of that treasure which under the name of town sewage is cast into river and ocean; by some suppression of the art which turns good food into bad drink; and, by passing such laws, that every son of the soil who wishes to follow the ancient profession of agriculture shall have the opportunity of following it in his own land, with profit to himself and safety to the Commonwealth.

Then, but not earlier, the skeleton may disappear, and permanent supplies of food replace its ominous presence.



Richard Wiseman,
SERGEANT-SURGEON TO CHARLES II.

Autotype from an oil painting in the possession of the Royal College of Surgeons of England.

LONDON, JULY 25TH, 1886.

B. W. R.

*RICHARD WISEMAN AND THE SURGERY
OF THE COMMONWEALTH.*

THAT surnames sometimes convey the character of their owners, as if the name at its origin was the natural expression of observing neighbours and friends, is beyond dispute.

In the man who comes before us as one of the surgeons who lived through and after the Commonwealth of England, the fact is well illustrated. Richard Wiseman, the surgeon referred to, was a wise man in deed as well as in name.

Richard Wiseman first appeared as a surgeon in the Civil Wars during the reign of Charles the First. He accompanied Prince Charles, afterwards Charles the Second, in his roving through Holland, France, and Flanders. He was present at the battle of Worcester, was taken prisoner, was soon liberated, came to London in 1652, acted first as an assistant to Mr. Edward Molin, and afterwards practised on his own account. On the Restoration, he was made Sergeant-Surgeon to the king; and on May 24th, 1676, published his "Chirurgical Treatises," having, as he says in the Preface, "made a vertue of necessity, and employed those hours for the publick service, which a frequently-repeated sickness for the twenty years last past denied him the use of in his private occasion;" so that it "pleased God, by casting him into such a condition,

to give him opportunities of thinking as well as practising."

Such are the few biographical notes which have been gathered regarding Wiseman. One or two more facts I have myself dug out of his own works. He attended the King, Charles the Second, at the Hague, and was with the court at St. Johnson's, in Scotland. When serving in the civil wars he was under Sir Alexander Fraser, chief physician to the first Charles. He lived at one time, early perchance in his career, in the Old Bailey, and had a kinsman named Jacques Wiseman, who seems to have been an assistant to him in important operations.

But, although the minutiae of Wiseman's daily life are not before us, we fortunately retain his published writings, and from these may extract many facts, which not only serve to indicate the character of the man, but also the state and condition of surgical science and art at the time he wrote and practised. It is well for us, too, in this respect, that his writings are not confined to one or two particular points. They embrace the greater part of the chirurgical learning of his day, and are told by one who was regarded as a renowned practical authority during his life; while long after his demise his book, looked on by young chirurgeons as the standard for learners, was regarded by older men as the standard for reference.

The labours of this master were collected in one volume, bearing the title, "Several Chirurgical Treatises." They were published by Benj. Tooke and Luke Meredith, at the "Star," St. Paul's Churchyard, and at Middle Temple Gate, Fleet Street. The epistle to the reader, signed by the author, bears date May 24th, 1676.

It has been customary to look upon the reign of Charles the Second as a backward or receding period in science in which, as Hume observed, "the king rendered his reign a misfortune to the kingdom and entailed upon himself the contempt of all the other powers of Europe." Notwithstanding, it is a libel to say that the age of Charles was wanting of scientific talent. In this reign the Royal Society had its infancy cherished, and during it many men of medicine of original cast lived and laboured. Biggs, who wrote so well on the structure of the eye; Sydenham of immortal works; Willis, whose essays on fermentation in diseases of the febrile class and whose anatomy of the brain are still so much prized; Sir C. Scarborough, whose introduction of the geometrical and mechanical sciences into the study of anatomy,—these alone mark the period to which Wiseman added his useful share.

What one present in the age itself thought of its scientific position, in relation to surgery, is supplied in Wiseman's Preface in a few notes which indicate his feelings and views. Speaking of his own works, he says, in regard to the novelties he has introduced, that "such ancient practitioners as are unwilling to be now learning a new lesson, will be angry that those definitions and descriptions, and sometimes methods of cure, are needed, from which they learned when young; those being the basis on which they have built the whole superstructure of their practice." To these, therefore, he does not address himself, but "to younger men who have their principles and practice yet to choose." "Others," he continues, "wholly taken up *with the novelties wherewith the age aboundeth*, will be angry that all new notions are not here pursued to nicety, and many little anatomical

and chemical punctilios inserted and brought in on all occasions, instead of the old way of expressing the accidents of diseases, with their causes and cure. I would have these men consider," says he, "that I am a practiser, not an academick; that I delight in those things as far as they are useful to life, but have thought it too great a digression from my present purpose to stuff up a practical book with such philosophical curiosities, which become it just as well as it would become a divine to fill a practical discourse with school distinctions." A little further on Wiseman laments the inaptness of the theory as applied to the practice of disease. "When," he remarks, "the young chirurgeon shall find the cure easie in theory, and appear so at first in the practice too, yet suddenly deceive him with a relapse, and not only once, but often delude his best endeavours; when the bystanders and persons concerned shall begin to accuse him of knavery in his proceedings, and think him to pull back a cure, whilst he is rolling Sysiphus his stone, which will tumble down whether he will or not; he will then wish that all other practitioners had done what I have done in this treatise, viz., recommend their observations, both successful and unsuccessful, thereby increasing knowledge in our profession, and leaving sea-marks for the discovery of such rocks as they themselves have split upon."

In the few passages here quoted the reader will gain a fair knowledge of the character of Wiseman,—a man of practice at every turn, conservative, yet liberal withal, and given to the observation of nature. Such men are always useful, and always make their way; they may not light on great discoveries, for their timorousness in thought and their hard fact propen-

sities prevent this accomplishment ; they, nevertheless, lay the basis on which after-discovery rests. They see as far as all is clear, and they chronicle what they have seen faithfully. If they do more, they do wrong, and wander even into wilder speculations than they whose cast of mind leads exclusively into difficult and original inquiries.

Wiseman's volume is made up of eight treatises. The first is on tumours ; the second on ulcers ; the third on diseases of the anus ; the fourth on the King's-Evil ; the fifth on wounds ; the sixth on gun-shot wounds ; the seventh on fractures and luxations ; the eighth on lues venerea.

ON TUMOURS AND ON THE TREATMENT OF VARIX, ANEURISM,
AND CANCER.

Wiseman defines a tumour after Galen, viz., as "a disease in which the parts of the body recede from their natural state by an undue increase of their bigness." Respecting the causes of tumours, he considers them according to their time and place, and thus calls them : "1, antecedent ; 2, conjunct. The antecedent cause is that which has not actually produced a tumour, but is thoroughly mixed with the blood, or otherwise lodged in some convenient place where it is not troublesome to nature, at least to the part, though, if not prevented, it does produce the feared effect." Of this sort of causes he reckons all impurities in the blood which do not start out into the solid parts ; as the matter of an erysipelas, phlegmon, parotis, and bubo, before a crisis is made ; so also any tumour in the body which, lying in any part of it, is apt to be translated to another. By a conjunct cause he means the very matter of the tumour that is already impacted into the

part, upon the increase of which the tumour increases, and on the diminution of which it diminishes.

In regard to the matter of which a tumour may consist, he attributes it originally "to humour; to wind, as in emphysema; to interposition of a solid body, as in hernia; and, to blood itself, as in varix, ecchymosis, and aneurism. In respect to treatment he often edged upon quite modern methods which he knew, whether he used or discarded them.

Treatment of Varix.

Speaking of varix and its treatment, he teaches that "varices ought not to be cured, unless they be painful and extend into a large tumour, or ulcerate and bleed much, for they preserve health. But, if there be a necessity of curing them, it ought to be begun with purging and bleeding, not once or twice, but often repeated; and if the viscera be in fault, they ought to be strengthened and amended; after which the cure may be endeavoured by astringent and exsiccant medicaments, applied with convenient bandages to press back the blood coagulating in the vessel, and moderately to resist the current. If these suffice not, then, according to the ancient practice, you are to proceed by section, dividing the skin and separating the integuments; then, having raised the varicose vein, you are to pass a ligature above and another beneath it, making a deligation of them; then slit the vein, cast out the gross blood, and afterwards digest and heal up. In my practice," he says, "I met many diseased with varicose swellings, but I never met with one patient that cared to hear of the cure by ligature; nor, indeed, have I seen any great reason for it. For if the unsightliness and pain be in the legs, it may be helped

by wearing a laced stocking, and placing a card, a piece of vellum, or a bit of beaten lead between them. A laced trowze will do much for the thigh. When they affect the belly they may be restrained by a bracer. The cure of hernia varicosa is by a good bandage, viz., a bag-truss."

TREATMENT OF ANEURISM.

Respecting aneurism he observes: "An aneurism is an ecchymosis, and, indeed, the highest species of it. It is raised, according to the opinion of authors, by dilatation or relaxation of the artery; they supposing the blood to have burst its passage through the first coat, and dilated the second, thereby raising the tumour. I am apt to believe that there is no such thing, but that it takes its rise from blood bursting quite through the artery into the interstices of the muscles, where it raiseth a tumour suitable to the cavity it findeth. But this tumour consisteth of blood extravasated, the artery lying undilated all the while."

That Wiseman here committed a great practical mistake is obvious enough. He was, perhaps, misled by the circumstance of having met with cases of external dissecting aneurism. In regard to his treatment of aneurismal tumours, some of it is dismal enough. Compression of the tumour, the application of unguents, bleeding in urgent cases, opening the tumour, and applying after-dressings that the wound might digest. In one remarkable case, he tied the artery. A man was affected with an aneurism of the right arm occasioned by phlebotomy. Some proposed to amputate, as the tumour was large, much inflamed, and painful. There were three other surgeons in attendance, Mr. Arris, Mr. Hollier, and Mr. Gardner. Wiseman proposed

amputation, or deligation of the artery. The deligation was decided on. Four days after, all the surgeons met; the patient was placed in a chair towards the light. Wiseman removed the dressings, and made a ligature four fingers' breadth above the tumour, on which Mr. Hollier made a grip. Some others held the hand and lower part of the arm. Wiseman then made an incision down the length of the tumour. That done he drew out the grumous blood with his fingers, and cleaned the wound with a sponge. Then desiring Mr. Hollier to slacken his hand, upon which the artery discovered itself by the blood spouting out, he, Wiseman, passed a needle under the upper part of the artery, tied that, and cut off the end of the ligature. Near the wound made in the artery by the letting of blood there a cartilaginous body was formed, which hindered his coming to the artery. He, therefore, cut it away, passed his needle, and made a second ligature. He then dressed the wound with pledgets spread with common digestive "*ex. terebinth. dipt in pulv. Galeni,*" applied "*empl. diachal. malaxed with ol. ros.,*" and "rowled it up to the ease of the patient." Upon that the patient was put to bed and had an anodyne draught. He slept well. The third day after, the dressings were removed, and all was found safe; "the lips of the wound tending to digestion." From that time the wound was dressed with sarcoticks, the loose flesh was rubbed with vitriol stone, and the cicatrising was hastened with "*aq. medicamentof.*" Wiseman attended until the ligatures fell off, then left the wound to the family surgeon. The patient did well and recovered the full use of his arm. This method of treating aneurism precedes not John Hunter's only, but that of Anel, of which our French confrères are naturally and properly proud.

TREATMENT OF CANCER.

On the treatment of cancer Wiseman followed three intentions. His first intention was the generation of good blood by attention to diet. The second was the correcting of the "atrabilious humours," by purging, venesection, or blood-letting. The third consisted in preventing the growth of the tumour, and disposing it to dispersion.

This last-named intention was to be done with care. Cancer is to be "moderately discussed." While the tumours are evacuating, mild "repellants" are to be applied, and afterwards "discutients." All the unguents prescribed ought to be beaten in a leaden mortar. "Lead beaten into thin lamina is usually worn in these cases, so is gold after the same manner." "The oyl of frogs is commended, and is made by baking frogs with butter in their mouths." "Frogspawn water is of good use in the summer if cloaths be dipped in it and applied; but they ought to be shifted as they dry and fresh ones applied." In winter, lest the patient take cold from this application, Wiseman recommends an elaborate cerate.

Let us pass to the manner in which our sergeant-surgeon removed cancer by operation.

That the operation might be done with success, Wiseman proposed the three following rules:—First, that the patient be of a strong constitution, and of a tolerably good habit of body, and not in a declining age, and, in women, when the menstrua have ceased. Secondly, that the cancer be loose, and the axilla free from painful glands; it were to be wished, also, that the cancer took its "original" from some accident, as a bruise. Thirdly, that the operation be performed in the spring or autumn of the year.

Wiseman, in this part of his instructions, attacks the empirics of his time, and speaks of a certain nostrum called "Mathew's pill," which seems to have been celebrated in its day as a quack specific. He objected generally to escharotic medicaments, but approved of the actual cautery, which should not be applied lightly upon the upper parts, but by thrusting it at "the root" with a scoop or chisel-like cautery, carrying it away direct. If there remain any "rags" of it, with a proportionate button cautery burn down to a "crust."

The practice of the cautery is illustrated by Wiseman in glowing terms. Some of his cases seem to have done well for a time. The coolness with which the operation was performed is inimitable. A man, fifty years old, in whom cancer of the upper jaw had been excited by the cracking of an apricot stone, was operated on. While various implements for burning were being forged, such as chisels and bolts, the patient was let blood, purged, and "prepared for the work." When operation time came, the instrument maker was there to heat the cauteries, and mend or alter them, as occasion should offer. One of the assistants then held the head and upper lip of the patient, whilst Wiseman, depressing the tongue with a *speculum oris* with the one hand, placed with the other a plain chisel cautery just under the upper lip into the body of that part of the cancer which stretched itself along the roof of the mouth into the palate, and repeated the use of that fashioned cautery until he had made a separation of so much. The carrying of the cautery thus was the way to preserve the sound parts from being scorched from the reflection of the glowing iron. "*It was also a great encouragement to the patient to see such gobbets burnt off with so little pain.*" At last, after cutting

and burning through the alveoli, "which were as rotten as dirt," the patient grew weary, and the physician thought enough was done for that time. Next day, and some following days, this process was repeated, the surgeon "drying and smoothing his work." At last a cure was effected in the space of six weeks, with a firm and smooth cicatrix. Incredulous Dr. Bate hereupon whispered to Sir Francis Prujeau, "that it would not hold a month." "But it held seven years, or thereabouts," says Wiseman. Others who at the first consultation had declared it an incurable cancer, now declared amongst their companions that it was no cancer. In the year 1668 the disease broke out again in this man after fever. The throat was now attacked, and he languished and died.

In one of his operations on the breast, where that organ was removed by the knife, Wiseman tried an experiment with the "Royal Styptic Liquor,"* which was given him the morning before by His Majesty's special command. Two arteries bled forcibly out, till Dr. Needham applied a lint button wet with the styptic on one, and Jacques Wiseman on the other. The doctor's stopped the bleeding instantly, and the compress adhered to it; but blood dribbled from the other till the application of another button, when that also stopped. Afterwards, the patient having vomited, one of the arteries burst out bleeding again. A re-application of the styptic stopped it; but Wiseman was not quite happy, and, it being night, gave the vessel an extra seal down with the point of his button cautery.

* This styptic, the composition of which is not given, was of French invention. The account of its introduction is described in the eighth volume of the "Royal Transactions."

By whatever way he removed cancer, it was the point with him to operate while the disease was recent. In later stages he clung to palliative measures merely, although sometimes attempting even then the radical cure, either at the request of the patients themselves, or by the authority of a consultation of eminent physicians and surgeons.

TREATMENT OF DROPSIES.

In Wiseman's time the common trocar and canula seem to have been unknown. Barbett, he says, had lately published the use of a hollow needle. "The repeated intrusion of this into the same or into fresh holes, say he and Sylvius, will evacuate water at your pleasure." Wiseman tried this needle, with Mr. Hollier, in ascites, but objected to it on the ground of the injury that might be done to the intestines as the body collapsed. He concluded that the best plan of treatment was the old plan of a canula made taperwise with holes in the side, which, being conveyed through a hole made by a puncture, may be kept in till all the water flows out. From one case which he describes it appears that he introduced his canula "three fingers width below the navel;" that he drew off the fluid in small quantities at a time, and that he left the canula in the wound so long as he was inclined to evacuate the fluid.

In cases of anasarca he seems to have trusted mainly to firm bandaging and the use of brisk purgatives. In one instance, when he was attending the king at St. Johnston's, being called to a man with a swelling of the scrotum, which he thought was hydrocele, he made an eschar with a caustic on one side, and afterwards opened the other side by incision. The man recovered. In other cases he scarified for hydrocele.

In hydrocephalic cases he teaches that, if the swelling proceed from effusion external to the cranium, it may be opened; but if it proceeds from within, he suggests that it be let alone. Children with hydrocephalic heads he holds to be of unsound constitution, rachitic, and scrofulous.

THE TREATMENT OF HERNIA.

In order to cure hernia it is necessary, Wiseman taught, to consider whether the hernia be intestinal or omental, recent or of long continuance, made by relaxation or ruption. He digresses to give an account of trusses. Bag trusses are recommended; they were made by Mr. Syms, in "Bell-ally, near Temple Bar." There were also trusses made of whalebone, others of thin laminæ of tin and steel; and these were made by Mr. Smith, a Scotchman, who lived near Fleet-bridge, —the most ingenious man in that work, and who made "the best trusses for retaining umbilical hernia."

"The same Mr. Smith," says Wiseman, "also invented an engine, by which he sets persons on their heads who were suffering from hernia difficult of reduction, and thereby reduced many which could not otherwise be relieved." Wiseman approves of this, and explains that if the plans already mentioned fail it is necessary to consider what the impediment is, and proceed accordingly to let blood, purge, or vomit, or put the patient into a semicupium, keeping on the bag truss the while, after which he may, if occasion require, be carried to and fro upon the back of a strong man, with his head downwards, by which the prolapsed bowels are often reduced.

Where the hernia is down and irreducible, and the patient is threatened with vomitings and inflation of

the abdomen, Wiseman is for early operation, while there is yet strength; "there seeming nothing of difficulty or danger in the work." The "work" itself is thus described:—"To perform the operation, the patient ought to be laid flat on his back upon a table or form, and bound thereon. Then an incision must be made upon the upper part of the scrotum to the Production, which requireth also to be divided, without touching the intestines or omentum; then a canula (like our common director, but big as a large goose-quill) is to be passed into the cavity, under the process of the peritoneum upwards, avoiding the intestines. Then make incision of such a length as may serve to put the fingers into the scrotum, and raise the intestines and omentum, which are to be reduced into their natural place within the belly." They being much reduced, the surgeon must stitch up the wound.

ON ULCERS AND THEIR TREATMENT.

Wiseman describes several varieties of ulcers:—The simple ulcer; the ulcer with "intemperies;" the ulcer with pain; the ulcer with fluxion; the ulcer with hyper-sarcosis; the ulcer with caries of the bone; the ulcer with callous lips; and the putrid ulcer. In the treatment of simple ulcer he orders dressings of various kinds, and the laced stocking. Ulcers with pain he soothed with anodynes. When there was caries he practised the removal of the bone as the only means of cure. Sometimes in such cases he removed the bone at once, in other cases he laid it bare and applied to it medicaments to assist its removal. Speaking of cases of this kind, he lets us know that in 1652 he passed from Chester to London, and took in his way

the little village of North Luffenham, in the county of Rutland, still a pretty rural place, and here stayed to treat a freeholder for a tumour of the thigh. Our surgeon opened the tumour, let out the contained matter, and, finding the bone carious, had a cautery made at the smith's, and dried the bone that way. "The exfoliation was here insensible, the scales mouldering away." When our operator left the patient the ulcer was nearly cured, and one or two months after the freeholder returned to his husbandry.

In another case he took out the lower jaw, cutting through the bone with watch files. This must have been done during the wars, for the patient was an officer in the King's Regiment of Foot, who, while marching at the head of his company on a hot summer's day, was seized with a pain in one of the teeth of the lower right jaw. A tooth-drawer, in taking out the tooth, fractured the alveolar process. This was the origin of the malady. Wiseman's operation led to complete recovery.

Wiseman hated empirics, and always attacked them when he had the chance. He refers to the mischiefs arising from the use of a purgative called Lockhart's pill. In one case he gave a braggart empiric full scope, and allowed him to dress an ulcer his own way, a speedy cure being promised. The result was unsuccessful, and the patient again resorted to Wiseman; she recovered, and by the continued use of the laced stocking remained well. In one instance, where an ulcer existed over the fibula with caries of the bone, he cut through the tendons covering it, and in time removed the bone, a callus forming in its place.

In the year 1654 he tells of a Londoner who, on his own chirurgeon dying, asked Wiseman to take his

place for the same salary. Wiseman accepted, and the case did him credit.

TREATMENT OF HÆMORRHOIDS.

In some cases Wiseman used the royal styptic liquor; also "that old remedy, fryed leeks and butter beaten to a cataplasm." He did not hesitate to remove hæmorrhoidal tumours, and it may be inferred from one passage that he occasionally employed the ligature. As an astringent red wine is recommended. When the bowel protrudes, and has to be returned, this astringent is to be applied with *scarlet* cloths. Why scarlet? There is an explanation to be found some day about this. To excrescences vitriol stone is applicable.

All species of excrescences about the anus are for the most part, as Wiseman thought, symptoms of the lues venerea. In removing excrescences he used the "*speculum ani*;" and, when he thought it proper, applied the ligature to the base of the enlargement.

For fistula in ano, the way of laying open the fistula was, according to his view, either by incision or by ligature. The incision was made with scissors, if the sinus was short; with the thread if long. Cauterisation with vitriol was likewise practised.

THE CURE OF THE KING'S EVIL BY THE ROYAL TOUCH.

Wiseman, little given to credulity in matters ordinary, had a firm faith in the efficacy of the royal touch for the cure of scrofula, and is jealous that the kings of France should presume to a Divine right, as well as a royal and immortal gift, descending direct on the occupants of the English throne from the time of Edward the Confessor. If (he adds triumphantly) the French kings have the gift, they have it later than the

English ; Dupleix himself, a most diligent writer of French history, deriving it no further than Philip I. and "Lewis the Gross." The cure, says Wiseman, can be done without the sign of the cross, and he has himself been an eyewitness of many hundred cures by His Majesty's (Charles II.) touch alone, without any assistance from surgery. He gives the following statement about Charles I. :—" It is needless also to remember what miracles of this nature were performed by the very blood of his late majesty of blessed memory ; after whose decollation by the inhumane barbarity of the regicides, the reliques of that were gathered on chips and in handkerchiefs by the pious devotees, who could not but think so great a suffering in so honourable and pious a cause would be attended by an extraordinary assistance of God, and some more than ordinary miracle ; nor did their faith deceive them in this point, there being so many hundred that found the benefit of it. If his dead blood were accompanied with so much of virtue, what shall we say of his living image, the inheritor of his cause and kingdom, whom, though it hath pleased God to deliver out of those dangers that overwhelmed his royal father, yet it was with so long an exercise of afflictions, that though (God be thanked) he be not now likely to increase the catalogue of martyrs, yet he may well be added to the number of confessors ? This we are sure, that the miracle is not ceased."

But Mr. Sergeant Wiseman went even deeper into the royal touch mystery. He noticed the " evasions that obstinate and incredulous men have used to avoid so great a notoriety of experience." He takes upon himself to prove that the touched were not cured by change of air, not by the effect of imagination, not by

gold ; and these points settled to his own satisfaction, he supplies, for the purpose of meeting "the infidelity of many in his fantastical age," an account of what nature and art have done, or can do, for this disease. He says that the cases presented to His Majesty were chiefly those "*of tumour about the musculus mastoideus or neck ;*" also "*the thick chapped upper lips and eyes with a lippitudo.*" In other cases, "*We give our judgment more warily.*"

His definition of king's-evil is as follows :—"A tumour arising from a peculiar acidity of the serum of the blood, which, whensoever it lights upon glandule, muscle, or membrane, it coagulates and hardens ; when it mixes with marrow, always dissolves it, and rotteth the bone."

The remote causes of the disease he believes to be referable to various heads, viz., "living in a thin and sharp, or thick and foggy air ; diet of salt, sour, and slimy meats ; want of exercise ; natural complexion ; hereditary transmission ; the milk of a nurse infected with the disorder." External accidents are also, he infers, occasional causes of the evil, but when they excite the disease, "they suppose a predisposition of the body to it." "A straight stay, as some women and children wear them, hath too often the same effect."

The glands, muscles, viscera, membranes, tendons, or bones, are the parts most commonly affected with the disease. He does not remember to have seen the nerves or brain affected with a scrofulous tumour.

In the cure of king's evil, Wiseman held that three intentions were necessary—1. The "regiment" of diet and the other "non-naturals ;" 2. Pharmacy, or internal prescriptions ; 3. Applications of externals,

either to discuss, suppurate, or extirpate the glands. His dietetic plan is not very profound. He sometimes recommends fasting; at other times he orders medicated broths and ass's milk. Good air he considers a great help to cure. Hampstead is too piercing, Kensington is more gentle. He mentions one fact "which he leaves to his reader's judgment, whether it ought to be attributed to the smoke or the northern blasts from Highgate." A patient of his and of Dr. Thomas Cox was wasted almost to skin and bone. They removed him to Knightsbridge, from whence, after some weeks,—he having a little recruited his strength and being eased of his cough,—they removed him again (for the more conveniency of curing an ulcer with caries of the cranium) to a lodging near King's Gate, Holborn, which stood backwards, and airy enough opening to the fields. In two nights he was so much worse that they expected he might die. They took him back to Knightsbridge, where he soon recovered.

Exercise of body ought, Wiseman held, to be enjoined in this disorder, "it being necessary to waste superfluities." Sleeping in the day is forbidden. Passions of the mind ought to be tolerated. The pharmaceutical treatment of our author it is impossible to follow. He gives us prescriptions by the square foot. Mercurialisation was with him an occasional means of cure in strumous cases. The external applications recommended are ointments of various kinds. Opening the tumour if it contain pus, and extirpation if it be loose, are necessary lines of cure.

Some time about 1673, being called into the country, Wiseman returned home grievously diseased; but a bad case being on hand in which he had attempted to operate for the removal of a spina ventosa in the inferior

maxilla, he was carried from his room to the consultation, at which Dr. Lowre was present. The case was one of convulsions, tetanus following operation, "suspected to be occasioned by some shivers of the bones pricking the membranes." A few hours later he was called again, but had not strength of hand to make use of the knife.

"Dr. Charleton and Mr. Hollyer were at a public dissection in our theatre, where Dr. Walter Needham was reader; only Dr. Lowre and Jacques Wiseman were to be found." These gentlemen, therefore, operated by removing a portion of bone of the eschar. This patient died convulsive on the third day—a result ascribed to the constitution of the patient rather than to the operation, *per se*. In illustration of the great evils that may arise from little ones, Wiseman remarks on the "Monument in Westminster of the young lady holding up her finger prickt with a needle, of which she died." No doubt the famous lady whom Mrs. Jarley afterwards immortalised through little Nell.

In this part of Wiseman's works, we read of the *Public Healing Exhibitions*, possibly at hospitals or dispensaries. We learn also that he lived now near Covent Garden; that a Mr. Stockdale made instruments for him; that he sometimes got attacked on the subject of his skill, and once had to obtain a letter from a gentleman whose son had been under his care, whereby to save his reputation; that he went into the country during the year of the Plague; and, that William Clarke, who had been his servant, but afterwards settled as a chirurgeon at Bridgenorth, wrote a letter bearing date November 26th, 1675, to his "honoured master," about a case in which both were concerned.

ON EXCISION OF THE TONSILS AND ON TREATMENT OF
WOUNDS.

Two curious chapters on ophthalmia are followed by one treating on the tonsils, in which we are informed that Mr. Edward Molin was the first chirurgion who performed the operation of extirpation. He did it with the actual cautery "through a canula, well contrived for the purpose." The operation was not one, however, of clear extirpation. The pointed cautery was passed through the body of the tonsil, which afterwards "crumpled up." Wiseman improved on this operation by affixing a ligature round the neck of the tonsil and then snipping it off wholesale with blunt-pointed scissors. He also practised snipping off the uvula in cases where that organ was elongated, but I must let these matters pass in order to come to the *treatment of wounds*.

Wiseman's definition of a wound is at once simple, precise, and brief. "A wound is a solution of continuity in any part of the body, suddenly made by anything that cuts or tears, with a division of the skin." Not less simple and truthful was his plan of *treating* wounds. I give his own words on this subject.

"The wound being a solution of continuity, doth require to be made one again,—*Unity being the perfection of whatsoever hath a being*. To effect this is the work of nature and art; both must mutually join their helping hands, and unless both the vital faculties and nourishment of the part do assist the art of the chirurgion it will be lost labour; here must be a joynt meeting and agreement all in one." For simple wounds the chirurgion is to afford assistance by five "intentions."

“1. By careful and diligent taking away all such extraneous bodies as by their agglutinations may hinder the true agglutination of the disjoynted parts, whether they be concrete blood, hair, sand, dust, pieces of bones, cartilages, or pieces of weapons, rags, and the like.

“2. By bringing the lips of the wound evenly together.

“3. By retaining the lips so brought together that they may, by consolidation, be restored to their former figure.

“4. By considering the temperament and natural heat of the part, in order to union.

“5. By preventing all accidents, and correcting such as have already seized the part.”

The second of these *intentions* is to be performed by bringing the lips of the wound exactly together. “This intention is delivered in a few words, *but they are to be observed as a law*. Nature hath nothing to do here in bringing the lips together, that is the sole work of the chirurgeon; who must not lay a pledget, or crowd a dossil of lint into the wound; *no*; that is the way to keep the wound open, and make it painful, whereby defluxions are stirred up, the temperaments of the part weakened, and the cure prolonged.”

Wiseman is further very exact respecting the way in which wounds are to be brought together. The parts must be made to answer one another, that nature may do her work more speedily and surely.

For the holding together of wounds he recounts three plans,—recoiling, stitching, and “fibulas or clasps.” He explains why the sympathetic powder gained so much credit, *i.e.*, nature alone effected the cure. He enumerates several kinds of stitches; the separate stitch, the glover’s stitch, the stitch “performed with

pins and needles, as in hare-lips," and the dry stitch, *i.e.*, the laying of two pieces of some adhesive plaster on each side the wound, and, when they adhere, the passing the stitch through the one and the other of these, instead of the skin. In the cure of wounds the habits of the patient must be carefully considered. He considered it bad practice, in cases where the wounded were free livers, to put such at once on low diet.

In the wars Wiseman had constant experience in the cure of compound wounds, especially of those inflicted by the sword. These wounds were mostly produced when the horsemen fell in amongst the infantry, in which case the latter had the worst of it by considerable odds. In the treatment of such wounds he was once, he says, assisted by Mr. Sanderson, "now one of the surgeons of St. Bartholomew's Hospital." At Stirling, in Scotland, he was helped by Mr. John Chase, Apothecary to his Majesty. In compound wounds he still recommended the attempt by the first intention.

Wounds of Arteries.

If the artery is wounded by a simple wound, the lips of the wound may be brought together by a glover's stitch, and firmly bandaged afterwards. If this does not succeed, the artery is to be "taken up and tied." If tying cannot be accomplished, escharotics or the actual cautery are to be used.

Surgery on the Sea.

In speaking of wounds of the face, Wiseman introduces an occasional anecdote, throwing a little light on his own career. "When," says he, "I served among the Dunkirkers, when snick and snee was, as it

were, a fashion, I had much of this sort of work" (face mending), "and for your diversion shall set you down one instance of that kind. While our squadron laid at anchor in the Groin, there came in some Hollanders, under the action of Hamburgers, with their ships new trimmed up for the King of Spain's service: A boatswain of one of these ships happened to be in company ashore with some of our men. While drinking together, the Hollander began to prate of religion, upbraiding one of our men for wearing a cross, and after a while he became quarrelsome, and swore, *sacrament*, he would not wear a cross; no, the devil take him, repeating it often. One of our men beat him down, and fell with him; then, kneeling upon his breast, and holding his head down, he drew out a knife, and cut him from the ear towards the mouth, then from the os zygoma to the neather jaw. 'Now,' said he, 'you shall wear a cross, that the devil do not carry you away.'" Wiseman being called, treated the wound by suture, and produced a satisfactory cure. The patient was proud of his scar.

FINALE.

Wiseman's writings discover to us many other curious anecdotes. They introduce us to Prince Rupert's chief chirurgeon, Mr. Shocque, and to the General Chirurgeon of the Scottish army, Mr. Pennicuke. They exhibit Wiseman in the character of fighting chirurgeon, running away from Truro with the rest; and, in order to release himself from a wounded trooper, showing the trooper a portion of his (the trooper's) own brains, as a kind of proof that a chirurgeon could do no good if he stayed; the sight whereof so "calmed" the patient's "passion" that the chirurgeon had liberty to continue his flight. They

exhibit the sergeant further at the fights at Musselburgh, Taunton siege, and Weymouth; at which latter fight he is discovered while running away, halting, a breath, to assist up an Irishman who had been operated on a day or so before, and the Irishman, once on his legs, outruns the chirurgeon.

Lastly, the surgical reader will find among other things that Wiseman, in amputation of limbs, used the circular incision, but incised at once to the bone; that he stopped bleeding vessels by the cautery or ligature; that he was a conservative in regard to operation, and refused to cut off a whole hand, if even a finger could be saved; that he knew how to reduce shoulder dislocations by putting the heel in the armpit; that he prescribed mercury and sarsaparilla in syphilis, and did not believe in the cure of syphilis without mercury.

In the Royal College of Surgeons there is a fine oil painting of Richard Wiseman, which portrait, by the kindness of the Council, I present, in autotype, with this ASCLEPIAD. The face speaks eloquently for its original, and is, I believe, all else that remains of the personal history of the best representative of the chirurgeons of the Commonwealth.

OPUSCULA PRACTICA.

“There are mites in science as well as in charity.”

BENJAMIN RUSH.

MILEAGE OF THE CIRCULATION.

IN preparing lectures on vital or animal mechanics for a Cantor course at the Society of Arts, several practical points of new or renewed study have come before me, some of which are, I think, deserving of brief notice. One of these is the question of the mileage of the blood-current of a healthy adult man, in whom the current shall be traversing the conduits of the circulation under the direction of sixty-nine strokes of the heart per minute, at the assumed propulsion of nine feet at each left ventricular pressure.

The distance traversed would, I estimate, be at the rate of two hundred and seven yards per minute, or seven miles per hour, or one hundred and sixty-eight miles per day, or sixty-one thousand three hundred and twenty miles per year. Supposing, therefore, that a man who has lived eighty-four years could have one blood corpuscle floating all that time round his circulating channels,—as a planet circulates round a sun,—that corpuscle would have performed at the close of the time named the grand tour of five millions, one hundred and fifty thousand, eight hundred and eight miles. The

heat generated by friction in this motion of the blood we may take as included in the normal constant of ninety-eight and four-fifths degrees Fahr. What the excess would be when, as in fever, the rate of passage may extend to over double the normal, or fourteen miles an hour, at full tension, can only at present be estimated on data which have to be formulated and are, therefore, inexact. But here a most important field is open for inquiry, and includes the questions—1. Is the excess of febrile heat in pyrexia due to increased pulsation at full tension? 2. Is the increased motion due to the high temperature? 3. Are both dependent on one common cause? We really know nothing about pyrexia until these questions are determined. A pigeon lives always at what in the human subject would be the highest pyrexia. Its temperature is 108° Fahr.; its arterial pulsations are 140 beats per minute; and, it has a surface of body presenting the fullest resistance to conduction. Does this truly pyrexial animal owe its normal high temperature to its rapid circulation? Does its high temperature give rise to its rapid circulation? Or, are the heat and motion dependent on one common undiscovered cause?

CHELOID FROM SODIUM ETHYLATE.

IN two instances which have come before me where the sodium ethylate has been used for the removal of what are called mother's marks, "port wine stain," cheloid has been induced. The subjects in both cases have been males, and both young. The induced affection partakes of every character of true cheloid; but why it has been developed I cannot explain. There was in neither case any exces-

sive application of the ethylate, neither was there any peculiarity of the patients, except that both were young men, that in both the stain or mark was on the face and neck, that in both the development of the cheloid was not observed until after six applications of the ethylate, and that no scar or other mark was present at the point where the cheloid appeared.

The character of the cheloid was unmistakable. In the first case it was a single tumour raised into a rounded ridge with tapering ends, almond-shaped, one-fourth of an inch high, and an inch and a quarter long; the surface red, the structure firm and adherent by a broad base, as these fibro-plastic cutaneous enlargements usually are. In the second case the tumour was multiple, consisting of a cluster of three cheloids, each smaller than in the previous case, but equally characteristic.

The treatment adopted in both instances consisted of giving up the use of the ethylate and of rubbing into the cheloid the unguentum hydrargyri nitratis. Under this plan the first case went on satisfactorily, the tumour passing slowly away. The result in the second case I have not yet learned.

There are two facts of importance in the histories above narrated,—one pathological, the other practical. Pathologically we are led to ask,—Why does sodium ethylate act on the skin in such a manner as to lead to cheloid? Is its action directly chemical, or is it from irritation produced from its caustic influence? My impression for the moment, and subject to correction, is, that the action is direct and is due to a coagulation of gelatinous structure by the alcohol liberated in the decomposition of the ethylate, without destruction by the sodium that is also liberated. If this be true, it suggests that sometimes in the cutaneous structure

the extrusion of some morbid fluid into that structure, at points where its vitality is reduced, may lead to the common cheloid. Practically, we are led to inquire whether there are any signs by which in a case of "port wine stain" we should foreknow that the use of the ethylate would lead to cheloid. The question is one I cannot answer. For many years past I have employed the ethylate for removing these marks, often with great success, and these are the only two examples in which the cheloid demonstration has occurred.

PERSISTENT SWEATING IN INTERMITTENT STAGES.

IN THE ASCLEPIAD for 1885, vol. ii., pp. 190—92, there is related from the *Medical Press* the history of a case by Dr. Myrtle, of Harrogate, in which the patient, a man seventy-two years old, died from persistent sweating. Since then I have received the details of other cases, similar but not so severe, to one of which attention should be called.

In this instance the patient, Miss C. E. de M., has herself supplied me with the history of the symptoms and with a memorandum and temperature chart by Dr. Dabbs, of Shanklin, Isle of Wight, under whose care she remained during the whole of the attack. Miss M. had suffered, three years previous to the occurrence of the particular symptoms now under consideration, from typhoid fever, and also from some signs of a tuberculous nature, so that she was an invalid before the attack. She took what she considered to be a chill in the summer of 1884, and suddenly began to perspire. The perspiration came on every day from ten to one o'clock, and again from ten to one o'clock in the night, with occasional repetition in the early part

of the evening. During these times she was simply bathed in perspiration, so that all her clothing was completely saturated, the bedclothes sharing the same saturation when she was in bed during the paroxysm. In order to give every attention to the various remedial measures that were suggested, a professed nurse was obtained from London, and all changes of treatment, general and local, were tried, but, as in Dr. Myrtle's case, without any effect. The perspirations began on August 1st, 1884, and continued until the first days of November, when they suddenly and completely ceased. Owing to the existence of continued pain in the epigastrium, Dr. Dabbs inserted a seton over the seat of pain, and it is worthy of note that the cessation of the perspirations occurred at the time when the discharge began to take place from the seton. This practical fact deserves remembrance in similar intractable forms of the disease. Miss M. has had no recurrence of the intermittent perspirations since 1884.



A WRIST CLIP FOR THE STANDARD SPHYGMOGRAPH.



NEW and very simple wrist clip has just been completed for me by Messrs. Krohne and Seseman as an attachment to the standard sphygmograph. The clip seizes the two loose bands or straps which come from the instrument to encircle the wrist, and is so arranged that, when it is pressed upwards, after the natural pulse stroke is found, the sphygmograph is held firmly to the wrist at whatever pressure may be desired, and remains unchanged until the tracing is written. The advantages of this clip are considerable. It saves all the adjustment of a buckle; it adapts itself to every wrist; the more it

is tightened the firmer is its grip ; it gives no trouble during the adjustment of the spring pad upon the artery ; and, when the correct adjustment has been made, it moves into position and maintains the adjustment with the utmost readiness. It is no doubt true that by long practice with the sphygmograph an operator may acquire the art of governing the pressure by his own hand, so as to obtain fairly uniform results. But for this long practice is required, and, at the best, the results are imperfect. The new clip removes all difficulties ; it makes the weighing the pulse facile, and renders the tracings at different pressures positive.

KAURI GUM AS A MEDICINAL SUBSTANCE.

 ANY years ago Dr. Hammond, of Bournemouth, presented me with a fine specimen of Kauri gum, which one of his sons had brought from Auckland, in New Zealand. In experimenting with the gum thus supplied I have found that it may be made to perform many useful services in medicine. When the gum is burned,—and it burns briskly,—it gives out a very pleasant odour which destroys the odour of putrefying organic substances most effectively. Dissolved in spirit it makes a fluid which burns in the lamp with good effect. Reduced to a fine powder and shaken with water it communicates to the water new properties, so that sprayed in a room it renders the air ozonic. It mixes well with ointments, forms a good combination with soap, and combined with iodine is a useful deodoriser and disinfectant. The gum is from a pine, the Kauri tree, *Dammara australis*.

VIS MEDICATRIX NATURÆ.

THE study of an address on the *Vis Medicatrix Naturæ*, by Dr. J. Wallace Anderson, in the excellent *Glasgow Medical Journal* for November 1885, leads me to revert to a subject I have more than once dealt with—Whether it be really true that nature is a curer, and that “our natures are the physicians of our diseases?”

The origin of this saying, “Our natures are the physicians of our diseases,” is attributed to Sydenham. I think it was said long before his time; but that is of less consequence than the argument it conveys. Because if the saying be true, of what use are physicians at all, except as their own natures for their own maladies?

In other words, when the physical accident of disease has presented itself to us in any form, shall physicians endeavour to save from death? Shall they interfere, or shall they, reposing on nature as the physician, trust to her as the curer?

In studying the questions thus proposed, the primary object is to ascertain how far any skill which we may possess is actually demanded as skill to be enforced, in rule of doctrine and practice. The case is before us: is it a case where the sufferer will recover without any artificial aid; or is it a case where certain well-known and proved artificial assistance will assist recovery; or is it a case where there can be no recovery in the absence of artificial assistance; or is it a case altogether

incurable? Unfortunately, up to the present time the natural division of diseases into these groups has received no serious consideration, and so we are apt to mix up skill with no skill, the active with the passive. To those who merely pretend to cure, this unmeaning and confused admixture, in which all is maze and noise, is shelter and satisfaction. In the confusion, who shall discover the pretender from the earnest labourer? In this maze the pretender can move from morning to eventide, from year to year, from age to age, and his experience shall be, that of a certain number of sick treated, a certain number shall die, a certain number shall recover; a certain number shall doubt him, and a certain number shall lift him up as the greatest of curers, in whom they have what they call faith; faith, that is, in the man, not in his knowledge as a something that should be known. In this mazy crowd, in sorry truth, every shade of pretence finds its Alsatia.

But to earnest men this maze can be no shelter, no resting-place. It is time they were out of it; time they knew the boundaries, the limitations of cure. I will dwell on this topic a moment longer, in an endeavour to open the way to new thought.

We shall relieve ourselves of much embarrassment if we can come to some common standard of thought on the question whether there be any such distinct process as may be fairly demonstrated natural cure of disease. The *vis medicatrix naturæ*, what is it? Is it a word or a fact? We dwell upon it as if it were a fact; we dwell upon it as if it were a principle on which we can often rely altogether, and on which we can always rely to some considerable extent. Is this correct belief?

In my way of thinking, the belief has, in the concrete, no basis whatever: by which I mean that nature goes her own way without putting out any hand to us for our special and particular aid. If nature were a curer as is supposed, then all diseases were spontaneously curable, and all other curers than herself were impostors. But nature pursues her way with men as regardless of their infirmities as of their powers: her general course being towards some grand and unknown end in which the individual sinks into his true insignificance by the side of the vastness of her structure, work, design. The physical living being is born, and by the force of birth is launched into space; but from the moment it is on the earth it is under the physical influence of the earth. As when I take a stone and cast it into the air, it moves for a time against gravity, then finds a point in which there is just the balance between the initial velocity and the attraction, and anon begins in gentle curve to fall, until it has fallen and lies, dead; so man, passing through his curve, endowed with initial velocity or motion of life, is making really and always towards the earth. He is weak, the earth is dragging him; he is faint, the earth has drawn him nearer; he dies, the earth takes him to herself. I speak of course now only of the physical man.

So nature, projecting the man, leaves him to meet the inevitable attraction of the earth. She gives him initial velocity, she endows him with reason to avoid many dangers, and with this attribute of reason she clothes and protects him through himself. For her part she pursues her way; he may guard himself from her fury as best he can, enjoy the profusion and happiness she offers as best he may; but she must work for all, for the general good. The living man left thus

to his course, but with reason to guide him, is neither protected from disease, nor cured of it when assailed by any special natural power or force. On the contrary, the measure of his resistance to the accidental risks to which he is exposed is so small that it may succumb at a moment: nay, when the accident is so slight that the immediate consequence is avoided, the chance of restoration from the shock is but naturally commensurate with the resistance which the body can offer to the accident; no new power is evoked, no new velocity is put forth; the most that is restored is equilibrium, or return to the condition which the organism maintained previous to the accident. The term *vis medicatrix naturæ* is, in fine, an entire misnomer, except it be limited in application to the simple capacity possessed by the organism at given periods of life to resist gravitation.

I doubt not that much of the confusion of thought which has ever surrounded this theory of a force leading to natural cure, has sprung from the observation of the resistance of youth to shocks from which the advanced in life are unable to survive. It has long been recognised, for example, that the result of severe surgical operations rests so distinctly on age, that a given mortality from a particular operation, say lithotomy, may be predicated according to age, when a sufficient number of operations have been performed to afford the groundwork of a calculation. Thus from a general deduction the mind has been led to individual definitions, and what is only true in respect to the value of resistance to attraction, at periods when resistance is most active, has been made to appear true in regard to detailed changes occurring from disease within the body, until the most serious structural changes have been posted up as structural cures.

I remember, in illustration of this false method of reasoning, a lecture I once heard from one of the enthusiastic believers in the *vis medicatrix*. The Professor was desirous to demonstrate to his class the curative effects of nature in the disease known as pericarditis. He commenced his learned proof of natural cure by taking the heart of the "cured" man out of a glass jar, and by describing from the disorganised specimen how beautifully the heart, by exudation of lymph, had become everywhere adherent to the pericardial surface. By this adhesion it was argued the pericardium had been prevented from filling with water,—a far-fetched hypothesis in itself, by the way,—and so life had been saved. At what cost life had been saved, at what cost of future suffering, with what certainty of early death from mechanical impediment of the circulation, no word was told. The impression intended to be left on the mind of the student was, that in the disease in question nature supersedes art to such perfection that she had better in all such cases be left alone. To me this hypothesis of natural cure is beyond estimation mischievous. If I were to bring the abraded surfaces of the chest and arm together after an injury, and the two surfaces were to become adherent, I should be guilty of malapraxis; and, when nature binds two surfaces that should be movable into one inflexible surface, or does other equal damage, though she may not be imputed guilty of malapraxis, since she is carrying out her own determinate course, she is most certainly not effecting cure, nor silencing the medical art which should prevent such disaster by any better attempt at cure.

To trust to what is called nature, to the omission or neglect of scientific methods of cure, is to forsake the

path of duty and leave to chance that which strictly falls under the exercise of reason. The trust is fatalism in physic; fatalism extended beyond our own interests to the life interest of those who submit themselves to our care.

In the long catalogue of serious disease, natural cure is the last remedy discernible. What natural process of cure is to be seen, acting as a general principle to be expected or to be relied upon, in such maladies as tubercular phthisis, cancer, syphilitic ulceration, hydrocephalus, ague, tetanus, cholera, hydrophobia? Is that a cure which leaves the sufferer from acute rheumatism with a disabled heart, or the patient under scarlet fever with structural change of kidney? Does nature or art cure ovarian dropsy or cataract? To the issue straightway. What does nature cure? I for one confess not to know. I see the stone taking initial velocity from my hand, and, uninterrupted in its course, making its way in graceful bend complete: I see it rise quickly, reach its prime, fall, rest. I see it interfered with in its way; roughly, so that it shall fall in mid-course; or slightly, so that it shall vary in direction and fall short; but, once impeded, I see no natural agency tending to make it pursue its original natural direction, or giving to it new power to resist the attraction of the great magnet. This, moreover, is what I see in the course of the physical body during its transit from birth to death, and the inference I draw from the observation is, that in following out our business of treating disease we are bound to let no idle pleasantry entice us from the effort of bringing up reason to originate and support art for the cure of every malady; to let no shrinking from labour, or other cowardly device, win us from the conscientiousness that whenever we leave

disease to what we glibly call nature for cure, we confess ourselves to be what we are, incapable men, invoking an incomprehended and indefinite power.

What, then, are the natural boundaries of cure? When are we practically to say, Here and now our art, our skill, ends? To these questions, in my opinion, the answer is, that our skill ends only when in the living organism the natural cycle of life is completed. To my mind, all diseases which occur between the first and the second childhood are simple accidents; accidents as simple and as pure as collision or other physical misadventures; accidents to be avoided or prevented to a major extent, or if incurred, to be cured, if the curer has sufficient time to exert his curative skill. Within this boundary, though it may seem limited to minds enthusiastic beyond reason, the practitioner of medicine finds ample scope for the noblest development of his powers; though to some ultimate fact he must bend, as must every student of natural science. A Newton may march up to the law of gravitation, and show the earth attracting all things to itself; but at this point even a Newton must stop, feeling that with the discovery of the law the power of the mind given to man finds its natural termination, and that to ask to know more is to assume a desire to take the place of the Supreme will that designed the law. And so the healer, carrying up his research to the highest limit of the human intellect, may assert laws, but there must stop. Forcing his conclusions beyond this point, he is led into the impossible difficulty of inventing a new nature, of devising a scheme out of his own range altogether, by which the evolution of life out of death shall be superseded by the introduction of perpetual life.

EXPERIMENTS TOWARDS THE ANIMAL
BATTERY BY COMPOUND SYNTHESIS
AND MICRO-ELECTROSCOPY.

PART III.

THE ANIMAL DIELECTRIC.

THE subject which has had the first place in my work during the past quarter is the attempt to arrive at a correct idea of the structure, whatever it may be, which in the living body is capable of acting as a dielectric. If the living body is an electrical organisation in true as distinct from symbolical representation, then the dielectric must be found within the organism, and must be proved there, before the secret of action can be disclosed. The dielectric is the electric substance. The two electricities cannot exist without it; there can be no phenomena without it.

In the obscurity which prevails we might assume that the hypothesis of the animal body being an electrical organism is a pure chimera, and that the authority of even Faraday himself might be set aside in support of such an hypothesis, until something more than has yet been discovered is brought to light. I admit, at once, what many feel, that much of the experimental argument which has been expended on animal electricity, laborious, laboriously technical, and studiously learned though it may be, is so much

verbiage until a working solution of the difficulty has been made out. If the animal machine, in life, is an electrical machine, why can we not set it working like any other electrical apparatus? Or, if we cannot go so far as this, why cannot we determine the elements of the machine; and, as we would with a machine constructed by men, define the parts of it and their duties? Is there a primary battery, and, if there is, where? Is there a storage or secondary apparatus, and, if so, where? Are there conductors, and, if so, where? Is there a dielectric structure for a machine, and, if so, where?

In the fully-organised body of a living animal all these elementary questions are so confused or concealed, we might, I repeat, hesitate altogether did they stand alone. But, fortunately, there is in nature the most perfect evidence of the existence of an organic electrical apparatus, evolved by nature herself, worked by mental impulses, and playing the part so clearly, of a statical apparatus yielding electrical phenomena, that we know the thing is done, although we do not, even there, know *how* it is done. In the electric eel, to which I now refer, we actually have the apparatus before us, and yet we do not comprehend the method by which it is worked; we feel the shocks the machine gives, and yet do not see how the charge is laid, nor, in a physiological point of view, how it is delivered.

I have had under observation the effects of the shock from two live electric eels. From one of them I took a shock sufficient to communicate a stun from the palm of my right hand through the arm to the shoulder, and across the fore part of the chest. I saw a similar shock from the same animal strike into insensibility the carp which are intended for its food.

After testing the shock which one of these animals expended on my own body,—receiving the shock from my left hand,—I fitted up an ordinary Leyden jar, and charged it so that it produced, to my sense, the precise power of the shock which the vital Leyden jar had produced. Between the two kinds of shock there was only one point of difference.

The shock I took from the eel from my left hand, placed over its body across the electric apparatus, was sharp, painful, and extensive. As I have said, it traversed my arm up to the shoulder and passed across the chest, leaving in all these points an after-sensation of numbness, which lasted for a period of five minutes and subsided very gradually. The shock from an ordinary Leyden gave precisely the same series of effects ; with the one difference, that on receiving the shock from the body of the eel under the water my hand seemed to be repelled ; while in receiving the shock, in air, either from within or without the common Leyden jar, no such effect of repulsion was perceived.

The shock from the vital battery of the electric eel, —local on large animals,—is sufficient to render small animals, coming within its range, generally insensible ; and, the assumed intention of the apparatus is to enable the eel to obtain its prey by the stun which it administers. But the stun itself is not, of necessity, fatal ; for small carp swimming near the eel, though they be made instantly insensible by the discharge, may, if they escape being swallowed by their potent enemy, show signs of renewed life very quickly, and in fifteen or twenty minutes may be seen moving about as briskly as if nothing had happened to them.

In my lectures on the physiological effects of the great induction coil at the Royal Polytechnic Exhbi-

tion, published in the *Medical Times and Gazette*, in the year 1869, I demonstrated that just the same effects, namely, stun and insensibility, could be produced by the common electrical shock of low tension. I showed that a surgical operation could be painlessly performed during the occurrence of this insensibility, with recovery as a result, in the same way as under anæsthesia from chloroform.

These observations are confirmatory of those made, long since, by Hunter, Walsh, and John Davy, as to the identity of the electric discharge from the living organic battery, in the electric eel, and the discharge of low tension from the Leyden jar. But I only refer to them here to indicate that in this vital battery, which is as truly a condenser as a Leyden apparatus, there must be a dielectric, and that from analogy there may be a dielectric playing the most vital of functions in the living body of all animals.

I have tried to arrive at the solution of this scientific puzzle,—whether there is such a dielectric,—by the exclusion process. We may take it as a safe argument that whatever part of the body will readily conduct a current, is not a dielectric. With a charge of low tension I have, therefore, tested the structures of the animal body to exclude every one that will play the part of a conductor, and to find if any one failing in conduction will play the part of a dielectric, like glass or sulphur, in connection with a conductor on its opposing surfaces. The results may be epitomised as follows.

Blood, either arterial or venous, either in its ordinary fluid form or condensed in any degree, or condensed by slow evaporation until it is semi-solid, or condensed by freezing until it is solid, fails to play the part. Under all these conditions blood conducts, differing from water

in that it conducts better than water,—owing probably to the iron it contains,—when solidified by cold, *i.e.*, frozen.

Bone, while it resists a voltaic current of low tension, fails to play the part. It permits the passage of discharge from the machine, and this although its structure be dried until it ceases to lose weight. The metal calcium in bone is probably sufficient to account for this result.

Membranes from all parts and organs, while they are in the state of hydration in which they exist in the living body, fail to act as dielectrics. The membrane which encloses fat offers most resistance to the voltaic current, but is quite useless, as an insulator, to a discharge from the machine. The vascular membranes, like the pia mater, are altogether out of the question. They conduct as readily as blood.

The structures of all the *vascular organs*, liver, kidney, spleen, lung, are in like manner negative as dielectrics. They all conduct.

Muscular structure is alike negative.

Fat reduced by cold to an extremely solid state, to such solidity that the body could not move in it, plays the part of a dielectric. But fluidified by warmth, so as to become as flexible as it is in the body, it loses its insulating power to the discharge from the machine, although it retains it until the fluidity is much more complete in respect to the voltaic current.

The secretions of the body, the urine, the sweat, the bile, the saliva, the mucus, the tears, are negative. They all conduct.

The gelatinous structures are all negative.

The nervous matter is the last and most important structure for inquiry. The grey matter plays no part

as a dielectric. It conducts readily both the voltaic current and the discharge from the machine. The white matter of the nervous substance is different. It acts more after the manner of a crystalline fat,—like spermaceti,—as a dielectric, than any other substance in the body. The difficulty of determining whether or not it is dielectric depends on the difficulty of separating it in the moist and fresh state from all connection of grey matter, of blood, and of membrane, for the purpose of securing a definite experimental result. ¶

Proceeding by manner of compound synthesis, as explained in a previous number (*ASCLEPIAD* for January, 1886, pp. 75-87), I obtained the body of a large eel, that had been killed in the usual way by decapitation, and cut from the body transversely a portion four inches in length. I placed this portion of the body of the eel upright in a glass vessel nearly filled with fluid paraffine. I then passed down the centre of the spinal cord a length of fine platinum wire, permitted the wire to stand three inches above the level of the paraffine, and to terminate in a small metal ball. The section of the body of the eel being thus well insulated, I touched the body of it externally with the finger while a charge was given to the metal ball from the positive of the statical machine, and when the charge began to be rejected I withdrew my finger. The cord surrounding the wire was left charged, as in the Leyden jar. On connecting the outer surface of the body of the eel with the earth a discharge could always be taken from the ball. By suspending a light cotton-wool brush by a thread of silk near to the ball,—after charging from the machine,—the cotton first attracted to the ball was then vigorously repelled from the ball, and afterwards made revolutions around

the ball until the charge was used up. In some instances, after storing the organic battery in this way, I retained the charge for twelve hours, and then used it up in the work of moving the cotton-wool brush. In many instances, by waiting after the battery seemed discharged I got a forcible reserve discharge. These results could be repeated until they were disturbed by the decomposition of the animal structure.

In another series of inquiries I took the brain of the sheep after death, and letting it harden in alcohol until it could be cut into thin and even slices, I made longitudinal sections of it, so as to get sets of plates of varying thicknesses. I then very carefully coated these sections with gold leaf on each side over the surface of white matter, taking care to keep the edges of the leaf at least a fourth of an inch from any point of the margin of grey substance. Laying the sections on an earthenware plate, with metallic connection from the under gold leaf, so as to make communication with the earth through the finger, I tried to charge from the upper gold leaf by the positive terminal of the machine. The results were very curious. With plates the tenth of an inch in thickness the discharge always passed through directly, so as to communicate a slight shock to the finger; with plates the fifth of an inch thick the shock had to be rendered more intense for it to pass; and with sections a quarter inch thick there was no transmission at all. At the same time the condensation was very imperfect and very uncertain.

The research here is more than usually important. If it should prove that the white nervous substance is capable during life of acting as a condenser, after the manner of the secondary organic condenser which exists in the electric apparatus of the electric eel, the functions of

the nervous system would be read in a much more simple form than they are at this time. The fact would indicate that the nervous matter capable of being charged is all charged by induction from the surrounding media, and a nervous cord, instead of being considered a conductor, in the common sense of that term, would be a cord extending from the centres charged, like them, by induction. In short, the whole nervous system standing alone would be a condenser charged by induction from the blood, the vascular membranes, and the arterial pulsations, and giving out its force, as demands are made upon it, to excite all movements. The spinal cord, with its vascular grey centre and investing vascular membrane, would be in the position of a Leyden condenser; the brain, with its ventricular fluid and plexuses within, and vascular covering and grey matter without, would be a great central condenser; and, every nerve following a pulsating artery, and connected with it, would be a peripheral condenser.

There is much indirect indication of the correctness of this conception. At every minute of our lives the great arterial system is actively communicating to every part, central and peripheral, from sixty to eighty vibrations which can be objectively demonstrated, but are not subjectively felt. How are these vibrations absorbed, except by the nervous structure? Where are they stowed away, except in the white nervous fibre or in some subtle medium which that fibre secretes and holds? And these vibrations are, practically, life. In the experiment I have described in *ASCLEPIAD*, vol. ii., pp. 180-2, in which I was trying to resuscitate an animal recently dead, I got the most remarkable approach to success on record by the process of injecting over the arterial channels fresh blood in

vibrating or pulsating current. In this experiment the phenomena of life temporarily returned. They were not permanent, because they depended on my artificial pulse instead of the natural animal battery which produces them in life ; but they were declared for the time, and so far cleared the way for further advance towards their prime source.

I am brought back at this point to a theory which I put forward under the title "A Nervous Atmosphere or Ether" (*Medical Times and Gazette*, vol. ii., p. 113, for 1867, and vol. i., p. 507, for 1871), in which the attempt was made to prove that during life and at the natural temperature of the living body, there exists in the nervous fibre an atmosphere in sufficient tension to be susceptible to all mechanical vibrations, and to play the part of an intercommunicating medium between the nervous organism and the outer world. I proceed further now. I venture to suggest that it is located in the white structure of nervous matter ; that it possesses the dielectric qualities which are essential to an organic nervous mechanism, as well as of absorbing arterial pulsations and external vibrations presented to the nervous expanses ; and that, by its presence, it distinguishes the animate from the inanimate condition of animal matter.

COTEMPORARY PRACTICE AND LITERATURE.

"Every physician will and ought to make observations from his own experience ; but he will be able to make a better judgment and juster observations by comparing what he reads and what he sees together."—FRIEND.

THE ANTERO-LATERAL DESCENDING TRACT OF THE SPINAL CORD.

(By W. R. GOWERS, M.D.)

IN the first edition of his "Diagnosis of Diseases of the Spinal Cord," Dr. Gowers pointed out that there exists, in the lateral columns in front of the pyramidal and cerebellar tracts, a tract of fibres which degenerates upwards through a considerable extent of the cord. Since then corroborative observations have been published, and the tract has been rediscovered in the developing cord by Betcherew.

Gowers himself has traced its degeneration in several other cases of ascending degeneration of the cord, and also in locomotor ataxy, and in the *Lancet* for June 19th, 1886, has returned to this subject, and, in one of the most original contributions of the year, has revealed some additional facts and observations regarding the relations and positions of the nervous tract as defined above.

"The tract," he now tells us, "extends across the lateral column about two-thirds of the distance from the

FIG. 1.

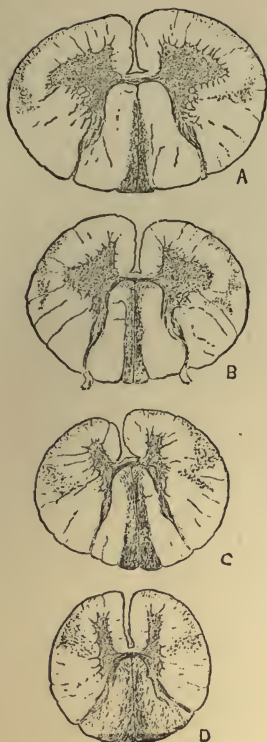


FIG. 1.

Ascending degeneration in spinal cord crushed by a fracture at the 11th dorsal. A, B, cervical. C, upper, and D, lower dorsal sections. Degeneration of the posterior median column and of the antero-lateral ascending tracts.

FIG. 2.

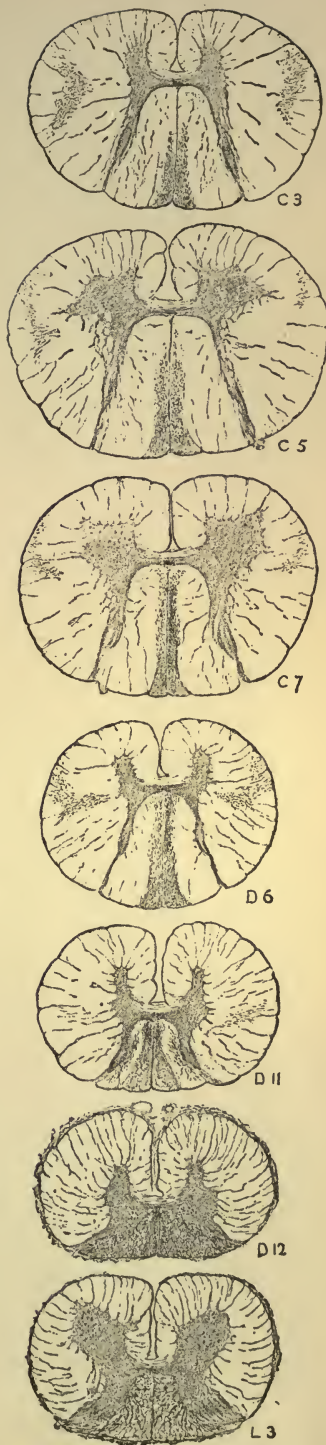


FIG. 2.

Sections of the spinal cord, from a case of locomotor ataxy, showing degeneration of the whole posterior columns in the lumbar region, but, higher up, only the ascending degeneration of the posterior median columns. In the dorsal and cervical region there is also degeneration of the antero-lateral ascending tracts.

Illustrations of Dr. GOWERS' Essay. From Lancet, June 19th, 1886.

surface to the intermediate grey substance (Fig. 1). It dips into the angle formed by the rounded anterior extremities of the pyramidal and direct cerebellar tracts, and it extends along the surface of the cord almost to the anterior median fissure. Betcherew could not trace it beyond the outermost of the anterior nerve roots, perhaps because it lessens in width, and other fibres are mingled with those of this tract. Dr. Gowers has traced it, in several cases, as far as the anterior pyramidal tract, where the sudden termination of the degeneration is sometimes very marked. In the upper part of the cervical region, where the direct cerebellar tract moves forward and the pyramidal tract again comes up to the surface of the cord, a process of the ascending tract extends between the pyramidal and cerebellar tracts, and may be traced almost to the surface of the lateral column (Fig. 2, c 3). About the middle of the dorsal region the tract does not extend so far forwards at the surface of the cord, and in the lower part of this region the tract seems to lie only across the middle of the lateral column, opposite the posterior commissure. This arrangement corresponds with the probable course of its fibres from the opposite half of the cord through the commissure.

“As far as is at present known, the direction in which the fibres of the central nervous system degenerate is that in which they habitually conduct. Hence the antero-lateral ascending tract conducts upwards, and there can be little doubt that in it we have the path for sensations of pain. It seems certain that these are conducted in the lateral column. The experiments of Woroschiloff have proved that the lateral column conducts the impressions that can raise the blood-pressure; and the impressions that have this effect are

for the most part, if not altogether, those that, through the agency of the sensorium, are perceived as pain. The only fibres of the lateral columns that degenerate upwards through any long course are these and the fibres of the direct cerebellar tract. The latter go exclusively to the cerebellum, and it is in the highest degree improbable that they conduct any form of sensation from the skin. Hence we must identify the antero-lateral ascending tract with the sensory path in the lateral columns."

In continuation Gowers argues "that continuity of degeneration must be taken as proof of continuity of fibre. Where fibres are interrupted by nerve cells, degeneration ceases. Hence the degeneration of the posterior median columns is proof that these fibres are continuous with some of the fibres of the posterior roots. But in a cord in which the cauda equina was diseased, while the posterior median columns presented the usual degeneration, no trace of degeneration could be found in the ascending antero-lateral tract. Hence we must assume that the sensory root fibres, from which this tract continues the sensory path, end in nerve cells, probably in the posterior cornua of the cord. The antero-lateral ascending tract seems to be formed only in the lower part of the dorsal region. It appears, therefore, that the sensory path from the legs only decussates above the lumbar enlargement. Clinically it is not until nearly the middle of the dorsal lesion is reached that a unilateral lesion causes crossed sensory and motor paralysis. In the lowest part of this region, and in the upper part of the lumbar enlargement, a lesion on one side impairs sensation on the same side as the motor. He is not aware that the degeneration of this tract in the spinal cord

has been hitherto described in tabes. In three cases, however, he found it distinctly degenerated. One of these is shown in Fig. 2. The fact is of interest in connection with the frequent loss of sensibility to pain, because, if the above reasoning is valid, degeneration of the tract is proof of degeneration of the sensory cells in which the nerve fibres that conduct sensations of pain terminate." *

MYXŒDEMA.

(VICTOR HORSLEY, F.R.C.S., F.R. S.)

(JAMES GORDON, M.D.)

TUDENTS who are following up the history of the newly described but no doubt very old disease, myxœdema, should read Professor Horsley's admirable paper, entitled "Further Researches into the Function of the Thyroid Gland and into the Pathological State produced by the Removal of the Same" (*Proceedings of the Royal Society*, January 7th, 1886, vol. xl., No. 242, pp. 6-9). They should then turn to Dr. James Gordon's paper on "Myxœdema following upon Removal of the Thyroid Gland" (*Lancet*, July 16th, 1886, pp. 65-67).

I.

Horsley's paper is, from beginning to end a model. The title is well chosen. Researches *into* the functions and *into* the pathological state; no mistake as to the object had in view; while the style throughout approaches that of the great volumes of the past of the Royal Society, when English undefiled and sweet to read was as severe a necessity for appearance in them as the most laborious research. Some few bad words

* I am indebted to the learned author of this valuable contemporary essay for the use of the blocks by which it is illustrated.—B. W. R.

left out, such as metabolic, abscissa, and hæmapoiesis, and the return to English literature had been nearly perfect in this particular essay.*

The researches of Professor Horsley show that the effect of removal of the thyroid gland in a young animal is the rapid appearance of violent nerve symptoms and death; that the same occurs in riper age, but not so rapidly; while in very old animals the removal hastens the torpor of old age. These observations refer to cats and dogs. In higher animals, monkeys, the operation produces the same results on the young; but older animals, if kept under ordinary circumstances, will survive for six or seven weeks, dying at the end of that time of myxœdema. The inference from this is, that the thyroid gland is of extreme importance when tissue changes are most active; an inference in accord with the observation of Huschke, that the relative weight of the thyroid gland to the weight of the body is greatest at birth, rapidly diminishes during the next few weeks, and steadily decreases as age advances. Another fact of great moment revealed by Mr. Horsley's researches is, that when the operation of removal of the gland is performed on animals living in air heated from 90° Fahr. to 105° Fahr., after they exhibit nerve symptoms, the effect of the heat is to lengthen the duration of life, in all but very young animals, four or five times the extent of that observed in a first series of operations, in which the animals lived at a temperature varying from 60° to 70° Fahr., and under which they quickly

* "An essay ought to be readable. Firstly, because it is written to be read; secondly, because if it is not readable it cannot be read; thirdly, because if it cannot be read it will not be read."—*Guizot*.

showed a fall of animal temperature. The animals, monkeys, kept under the high temperature, passed through three stages: 1, neurotic; 2, mucinoid; 3, atrophic;—a fact which the author thinks is a key to the observation that creatures in whom the thyroid gland is slowly destroyed, and sufferers from chronic myxœdema, do not exhibit much mucinoid degeneration.

In summary:—We learn from Mr. Horsley that the thyroid gland aids, indirectly, in removing mucinoid substances from the body by changing them into some other form which is useful to the system; that this process is of vital importance to the young animal; and that the loss of the process is distinctly connected with the appearances of the diseases known as *myxœdema*, *cretinism*, and *senile degeneration*. Defect of this process determines appearance of so-called functional disorders of the nervous system.

II.

Dr. Gordon's essay is a history of a widow woman, aged forty-two, from whom Professor Lister, eleven years ago, removed successfully the whole thyroid gland. This patient soon after the operation became so changed in appearance and voice that her own mother failed to recognise her. She became feeble, and in six months had marked symptoms of myxœdema. With this her nervous powers decreased; her temperature fell below 98° Fahr.; her hair fell off; her expression and speech caused her to appear dull and stupid; but her mind was placid and clear, and her organs of sense were unchanged in function. A slight pressure on the skin left a livid mark or ecchymosis.

Lately this patient has somewhat rallied; her hair has grown again, and her speech has considerably

improved. The progress in these points is gradual and insensible, but, notwithstanding, she remains a wreck of what she was before the removal of the gland.

TENDON JERK AND MUSCLE JERK IN DISEASE.

(S. WEIR MITCHELL, M.D., AND MORRIS J. LEWIS, M.D.)

FROM the *Medical News* of February 13th and 20th, 1866, Drs. Weir Mitchell and Morris J. Lewis have recast their paper on physiological studies of the knee-jerk, and of the reactions of muscles under mechanical or other excitements. Their researches have led them to examine with care—(1) The circumstances which increase and those which lessen the knee-jerk, and to consider the influence exerted by volition, motion, sensation, electricity, tension. (2) The characteristics of direct muscular motion caused by a blow, and the effects on it of voluntary motion, sensation, electricity, tension. These parts of the research are physiological and normal, and are followed by others, practical in character, which have received a full exposition before the Association of American Physicians at the annual meeting, held at Washington on the 17th and 18th of June last.

The authors hold that the knee phenomenon is a direct muscular response, and is not due to reflex action. The most delicate test for determining the condition of the muscle is by striking the stretched tendon. This can be done in various situations, as at the knee, elbow, and jaw. Every distant muscular exertion, such as winking, if accurately timed, exaggerates these phenomena. To demonstrate this the

patient should lie down with the knee slightly bent. At the time that the tendon is tapped, or just before, the patient is directed to wink, and it will be noticed that the jerk is much increased. A decided sensation, such as heat, cold, or an injury, will increase the responsive power of the muscle or tendon which has been struck. Both the tendon- and the muscle-jerk are reinforced by irritation of distant parts. This reinforcement disappears when the muscles are cut off from the spinal centres.

A blow on the muscle causes the muscle-jerk to extend up and down, but not transversely. In some cases of disease this jerk is irregular. In addition to this contraction the muscles may form a little eminence or mound, which disappears slowly. Late in ataxia this is unusually well marked. It is also observable in some healthy muscles. The phenomenon of reinforcement is attributed to an increase of tone in the muscle as a result of the distant irritation.

A tabular statement was presented, giving the results of observation in twenty-three cases of locomotor ataxia.

In the first stage of locomotor ataxia the tendon-jerk is diminished or absent, while the reinforcement is fair. In the subsequent stages both the tendon-jerk and its reinforcement are absent. The muscle-jerk and its reinforcement continue normal through the first two stages. In the third stage, while the muscle-jerk is normal, the reinforcement is absent. In the fourth stage the muscle-jerk is increased, while the reinforcement is absent. In the fifth stage the muscle-jerk is diminished, and the reinforcement is absent. In the sixth stage both the muscular jerk and the reinforcement are absent. The increase of the muscle-jerk, late

in the disease, may be due to some irritative changes in the muscle, but this has not been positively determined.

In regard to associated movements, in a certain proportion of cases, if the patient is directed to shut his right hand, the left hand will also shut to a certain extent. And if the patient is sitting down the leg may be drawn up. This condition has become more marked as the ataxic condition has increased.

Another symptom referred to, and which was considered a new symptom, is prominence of the eyeballs. It is sufficiently distinct to be observable if attention be called to it.

The research all through abounds in interest, and is another evidence of the continued vigour and originality with which Weir Mitchell, usually in conjunction with some distinguished brother in science, presses steadily onwards in his brilliant medical career.



CLIMATE AND HEALTH IN AUSTRALASIA.

(JAMES BONWICK, F.R.G.S.)

MR. BONWICK'S handy little volume, published by Messrs. Street, of Cornhill, is one of the most valuable shilling's worths of information that can well be met with. It comes in at this time of colonial visitation to the mother country with peculiar freshness and aptitude. The winds of the colony, the rains, the floods and droughts, the Alpine climates, the snowstorms, the coastland climates, the dry west, the highlands, New England, Sydney; the health of New South Wales; and, the land laws in New South Wales form the first part of the volume. Subjects similar in kind follow relating to Victoria, South

Australia, Queensland, Western Australia, and, at the close of the work, New Zealand and Tasmania. Excellent maps accompany each part, and carefully-prepared descriptions are supplied of the diseases which are present, the epidemics which have been imported, and the relation of varying climatic influences bearing upon the course of those diseases which spread by communication, as well as on those which affect the general health without being communicable from one person to another.

Mr. Bonwick, in treating on the miasmatic qualities of climates, points out that Australia experiences a fortunate freedom, comparatively speaking, from those qualities. Stagnant water, a fruitful source of disease everywhere, is far less an evil in Australia than in other parts, as there is little or no deciduous vegetation and no falling of leaves into the stagnant pools. Again, the very dry wind which licks up the moisture makes short work of miasmatic vapours that may have originated.

With considerable candour the author dwells on the many errors in the construction of cities in this new world, which have naturally crept in "before the hygienic period." But he is hopeful in this matter. The reign of health is declared, and time alone is required to rectify the primitive mistakes of a colony founded by necessity, in many cases, in opposition to scientific law. To the medical profession, who have now so often to recommend Australasia as a new climate for the sick, and for those who contemplate emigration, Mr. Bonwick's book is of special value.

HYDROPHOBIA.

(R. E. DUDGEON, M.D.)

IN reference to the article headed *Hydrophobia per Similia*, in last ASCLEPIAD, Dr. Dudgeon, whose learning and genius for observation those who most widely differ from him must recognise, writes me to protest that the process of treating hydrophobia by inoculation is not *homœopathic* in principle, but *isopathic*. The inoculation, that is to say, if it does anything at all, does not act by producing a similar but an isomer. I think Dr. Dudgeon is right, and am content to stand corrected. As to the practice of inoculation itself for treatment of hydrophobia, although Dr. Drysdale and Dr. Hime have written in its favour, the position does not seem to be in any sense changed. *Desunt cætera*.

 THE MEDICAL DIGEST.

(RICHARD NEALE, M.D.)

DR. NEALE deserves to be warmly congratulated on the new edition of his "Medical Digest" with first appendix (Ledger, Smith & Co., St. Mary Axe): The appendix brings the "Digest" up to the present time, fills 218 pages, and includes many new sections: To all working men in medicine, and who now are not working men, the "Digest" is simply invaluable.

 July
25th,


1886.



SOME PRACTICAL NOTES ON THE DIAGNOSIS AND ON THE AMMONIA TREATMENT OF FIBRINOUS OBSTRUCTIONS IN THE VASCULAR SYSTEM. A CLINICAL REVIEW OF THIRTY-SIX YEARS OF OBSERVATION.

IN the year 1850 it fell to my lot to revive the then much-neglected subject of the diagnosis and treatment of cases of disease acute and chronic, but chiefly acute, in which the circulation of the blood through the heart and blood-vessels is being arrested by what the old authors called "polypi," but which we moderns call fibrinous depositions, or separations of that constituent of the blood that is known as fibrine.

The discussions we held in that year, and during several succeeding years, were animated and sometimes warm, especially in the Medical Society of London, where they were most active. I recall them still with sincere pleasure, for they led to great and important changes both in theory and in practice.

At this moment, however, I have before me a clinical rather than an historical subject. The attention I paid to the diagnosis and treatment of fibrinous

obstructions, at the period named, led, naturally, to many opportunities of study from clinical observation, which up to the present time have continued. In this long interval—thirty-six years—I have been summoned on an average three times each year to a real or supposed case of obstruction, and it is from this rather unusual experience that I now presume to condense a few notes relating to diagnosis and treatment.

DIAGNOSIS.

In eighty per cent., at least, of the patients I have been summoned to visit, the seat of the obstruction from fibrine has been in the right cavities of the heart. In eleven per cent. the obstruction has been in the large veins, the iliac and the femoral. In six per cent. the obstruction has been on the left side of the heart. In three per cent. the symptoms of obstruction were simulated ; they were hysterical in character, and although very embarrassing, were not cases presenting the really dangerous indications of vascular obstruction.

Taking up the subject of diagnosis in detail, let me recall the symptoms which definitely indicate obstruction in different parts of the vascular system.

Diagnosis of Right Cardiac Obstruction.

The diseased conditions under which obstruction takes place in the right cavities of the heart are usually acute, and are what is commonly called inflammatory. They are cases of puerperal fever, surgical fever, erysipelas, pneumonia, croup, diphtheria, peritonitis, septic fever. All my acute cases, which constitute the large majority of the whole series, might be included in the above group, with the exception of one that

occurred, without any preliminary stage of an inflammatory character, in the later stages of pregnancy.

In the acute inflammatory cases the symptoms indicating obstruction from fibrinous separation on the right side of the heart are usually rapid in their manifestation. They may be reduced to the following seven indications—(1) *Apnœa*. (2) *Fulness of the veins*. (3) *Failure of the arterial pulse*. (4) *Reduction of animal temperature*. (5) *Pallor of the general surface of the body*. (6) *Collapse of the physical and mental powers*. (7) *Symptomatic physical sounds*.

The *first* symptom, subjective and objective, and the most apparent and distressing, is *the breathlessness, the apnœa*. It is, emphatically, a breathlessness with open air-passages, with perfect freedom from pulmonary obstruction, and with perfect freedom of the respiratory mechanism. I invented the term *cardiac apnœa*,—breathlessness from the heart,—to distinguish this peculiar symptom. It is due to the circumstance that blood does not reach the air in the air-vessels of the lungs, so that the effort of breathing is made to no efficient purpose. The blood is arrested on its way to the lung through the right chambers of the heart. The breathing is rapid, heaving, sighing, and the difficulty is always referred by the sufferers, if they can describe what they feel, to the heart. I remember one patient describing the breathlessness with such graphic truthfulness that his words became a sad memorial of practical diagnosis. “I can breathe freely enough, sir, but it does me no good.” That is exactly the fact, and sums up every description.

The *second* symptom is the *fulness of the superficial veins*, especially the veins of the neck, and sometimes the veins of the extremities. If a vein be compressed

by the finger, it does not fill more than it is already filled on the side furthest from the heart. This is a very useful point of diagnosis in other forms of disease, but it is singularly characteristic now. It tells that the right side of the heart cannot freely receive the blood which ought to pour into it; that it is as if a ligature were being applied to the superior and inferior venæ cavæ at their conjunction with the right auricle. In some instances a regurgitant movement of the blood in the veins of the neck is detectable, and it is always proper to look for this sign, although it is not always presented.

The *third* symptom is the *failure of the arterial pulse* wherever it may be taken. The pulse may be quick or slow, but it is always feeble. I do not remember a single instance in which I have known it to be intermittent or persistently irregular, except just at the time of death; but it is always thin and feeble. At the same time, the action of the heart may be forcible and even bounding, from the fact that the heart, though contracting on a diminished current, is excited by the pressure of the semi-fluid mass which is retained in its cavities into quick contraction. Cardiac overaction with diminished arterial tension thus run together diagnostically in these conditions of life.

Reduction of animal temperature is the *fourth* symptom of moment. The fall of temperature is often extremely sudden. In one case, the temperature fell within one hour from 105° Fahr. to 98°. This was the extremest variation I am conversant with from actual observation recorded at the time, but it may have occurred as distinctively in other instances, for I have often had it reported to me that from great heat of body there was a sudden decline to coldness, and, as a rule, I have found the body from one to two degrees

Fahr. below the natural standard whenever the certain signs of obstruction have been fully developed. In one instance the temperature was reduced to 96° Fahr. for some hours previous to death. The coldness commences in the extremities, usually in the feet, and extends towards the trunk of the body, but the patient rarely detects it or complains of it.

The *fifth* symptom is the *pallor* which overspreads the body; the pallor is not strictly anæmic, but is tinged with a bluish shade, producing what is more commonly known as lividity. The red colour of the cheeks is most distinctly replaced by this livid whiteness, which constitutes a very characteristic sign.

The *sixth* symptom is the *collapse*, physical and mental. The muscular prostration is marked by restless tossing and failure without convulsion. After a time the muscles themselves collapse, the abdominal muscles are drawn in deeply with each respiration, and the power of the voluntary muscles to perform any resolute act subsides. The mental prostration is equally marked. There is no apparent desire to effect anything except to breathe. The mind does not wander, neither does it sleep. A patient who recovered told me she knew everything that was going on all the time, but in such a listless way that she had no real interest in the anxious plans which we were carrying out to save her life, for which listlessness she said, in apology, that "she hoped she should be excused, because she was only half alive."

To the end of life there is no active convulsion: the mind loses its consciousness before the respiration ceases, and death when it comes is usually by a kind of coma, with asthenic or slow syncope.

The *last* symptoms which have to be noticed are the

objective physical signs yielded by auscultation. I notice that most practitioners look out for a cardiac murmur as a diagnostic sign, and are surprised when it is absent, but as there is nothing in a soft mass of fibrine to produce murmur, it is not often present. The effect of the mass is to act as a damper on the sounds produced by the valvular tension, or to hold down the valves by interlacement with their cords, and by crossing of their free margins. Thus that which is physically most diagnostic is a deficiency in fulness of the first sound in the early stage, to which must be added the differentiation of the sounds proceeding from the two sides of the heart.

After a little careful practice with a good differential stethoscope, this point is made out with wonderful clearness. With one mouth of the stethoscope over the seat of the tricuspid, the other over the seat of the mitral valves, we listen for the sound produced by the combined tension; raising the mouth of the tube over the mitral, we find that the sound is all but lost; then putting down the mouthpiece over the mitral, and raising that over the tricuspid, we hear the stroke nearly, if not quite, as perfectly as when both mouthpieces are down in their respective places.

In very extreme cases the physical diagnosis may extend to the second sound of the heart. The second sound may be differentiated as reduced or lost on the right side. This tells that the coagulum extends beyond the pulmonary semilunar valves; and after death in such instances, the clot will be found impressed with the figure of the valves as distinctly as such an impression can be made on plastic material.

These distinctive signs in any case of the kind we are considering—*viz.*, *cardiac apnœa*; *fulness of veins*

with or without regurgitant action ; feeble pulse, with forcible heart ; reduction of animal temperature ; pallor ; muscular and mental collapse ; diminished force of the first sound of the heart, differentiable as to the set of valves impeded—are sufficient to establish the diagnosis as clearly as physical diagnosis of any kind can be established by our present systems of research.

Some Exceptional Symptoms.

In a few cases I have met with certain pulmonary symptoms, which, though exceptional, are, when they happen, strikingly diagnostic. One of these symptoms is a sharp dry respiratory murmur. But the most significant symptom is emphysema. In infants and young children in whom there is obstruction in the right heart from fibrine, the emphysema may be extreme. I have seen it so extreme as to raise up the anterior wall of the chest into a rounded prominent form, almost immobile. The emphysema is produced by the forcible efforts of the sufferer to inflate the lungs, at a time when the vascular plexuses surrounding the air vesicles are so deprived of their blood that the balancing blood pressure is reduced.

Diagnosis of Left Cardiac Obstruction.

When a fibrinous concretion is deposited on the left side of the heart, the ventricle, the infundibulum, and the ascending portion of the aorta, are its most common positions. The general symptoms which characterise the presence of concretion here situated are different in many respects from the preceding. There is suffocative dyspnoea, with expectoration of mucus, sometimes mixed with blood ; the surface of the body is of a leaden colour, and the body is cold.

The muscular perturbation lapses into powerful convulsions, and coma precedes dissolution. These symptoms may extend over many hours; or, as in the preceding class of cases, they may also occur in a sudden manner. The patient, in moving or making a straining effort, may suddenly fall back, may be seized with a violent convulsive fit, and so expire.

The physical signs of concretion on the left side, in so far as the heart is concerned, are not materially different, in reference to the systolic and diastolic sounds, from those which attend deposition on the right side. For, if the right side of the heart is free, the two sets of valves on that side are all-sufficient to produce the two sounds; so that a mere reduction in the intensity, or rather the fulness, of the normal sounds, is the only probable modification. There is, nevertheless, a distinction in the action of the heart when the concretion is on the left side. The action of the heart is much more violent, irregular, and tumultuous. There is also a difference in regard to the physical signs of disease in the lungs; the lungs are not made emphysematous; but they are always congested, the congestion being most decided and extensive. Corresponding with this condition, the dyspnœa is not the syncopic dyspnœa which we observed in the previous cases, but a dyspnœa of the pure pneumonic type, laboured, yet free from gasping; the oppression, veritably, is in the lungs, and is described as such by the patient.

Diagnosis of Obstruction in the Blood-vessels.

The diagnosis of precipitated masses of fibrine in the blood-vessels is sometimes very easy, sometimes difficult. Occurring on the venous side of the circulation, and in

large veins like the femoral, the deposit is detectable by the touch. In the line of the vein the mass is felt firm, large, and, perhaps, knotted; the vein is dilated, and pressure, however gentle, may cause pain. Sometimes there is œdema in the limb below the seat of the obstruction, and I have seen this as a serious symptom, giving rise to what is vulgarly called "white swelling of the limb," a characteristic term distinguishing such swelling from that which is connected with the knee in cases of "housemaid's knee," to which the same term, less the words "of the limb," is often applied.

The deposit in the veins within the abdomen, such as the common iliacs, is not diagnosed so easily; but even in this position it may, with careful manipulation, be felt, when the body is well flexed, if there be no enlargement or swelling over it, and if there be no distension from flatus. I have never known the deposit to occur in the veins of the upper limbs. I have known it, however, in the sinuses of the cerebral circulation, and I once diagnosed the fact from the attendant symptoms of pressure and coma. After death the straight sinus was found filled to distension by a tubular coagulum of pure white fibrine, with free exudation of serum in the sub-arachnoidean space.

Separation of fibrine within veins is, as a rule, sudden in its development, and usually connected with one of the forms of pyrexial disease which have already been cited, the acute fever following child-birth especially. The accompanying conditions in these cases greatly aid the diagnosis, but sometimes the conditions are different, and then the symptoms are more obscure. Dr. Barrow consulted me several times on the case of Major M., who, during a review on a day extremely hot, felt, while in the saddle, an acute pain extending down the

whole of the inner side of the right thigh. The duties of the Major prevented him from quitting his post for three or four hours, at the end of which time he was in a state of great danger. His right leg was swollen, tense and painful, and a severe rigor was followed by acute fever. I was able in this case to diagnose precipitation of fibrine in the right common iliac, near to its junction with the cava, and I had the satisfaction of seeing recovery, by resolution of the obstruction.

In another case, about which I was consulted, the symptoms were more insidious, and the results more serious. A clergyman was suffering, if it may be called suffering, from slight redness, pain, and soreness of the fore-part of the leg, the veins of which had been for many years rather larger than natural,—varicose. His medical adviser, a man of large experience and calm judgment, looked upon the new affection as erythema, but gave very wise and practical instruction. A few hours later, the clergyman, having a sermon to prepare for a coming service, drew his chair near to the fire, and with his legs so near as to feel a sharp warmth, set himself to his task. Suddenly he felt a movement from the veins of the affected limb towards the centre of his body and towards the heart. This was followed immediately by the cardiac apnœa, and other symptoms indicative of obstruction in the right heart, and in a few hours by death. The post-mortem revealed a separated clot from the vein which, carried by the blood stream into the heart, had become the cause of the fatal catastrophe. On this case, it was my honest duty to report, that I should have been as little able to have foreseen the accident which led to death as my professional brother; a report which was to him a solatium to the close of his active and useful life.

An obstruction on the arterial side of the circulation is marked by coldness and numbness in the parts from which it cuts off the supply of blood, and as the obstruction is perhaps in every case carried by the arterial wave from the larger areas of the arterial system into the smaller, the symptoms are sudden in their appearance. I saw an instance of this kind with the late Dr. Sibson, where the clot was carried into the arteries of the upper extremities, which it plugged in the firmest manner, and arrested all circulation until anastomosis was established; after that all went well.

The most remarkable phenomena of any known in disease are occasionally met with in the class of cases now under consideration. I took up the *Times* recently, to read in the obituary announcements the death from old age of a gentleman whom I was summoned to see twenty-two years ago, in consultation with the late Mr. Edward Daniell, of Newport Pagnell, and his son, Mr. William Daniell. The patient was suffering, as these gentlemen had diagnosed, from fibrinous obstruction on the left side of the heart, and the symptoms were such that no reasonable doubt could remain. When I arrived the sufferer seemed to be *in articulo mortis*. He was convulsed at intervals, his extremities and body were cold, his consciousness was lost, and he had that peculiar pipeclay-like odour of the breath which might well be called the "*halitus morituri*." To the minds of us all hope was practically gone, and when, with my colleagues, I communicated with the friends of the sick man, I had the painful task of telling them the fact, adding, only, as a just possible but improbable forecast, that if the obstructing clot should be dislodged while a remnant of life remained, the circulation might be restored, and life also. The explanation was given

on the principle that while there is life there is hope, and I left my confrères at the railway station, to which they accompanied me, and on the way to which we discussed every detail again, with even that hope quite out of my mind. But, after a three hours' journey to London, as I put my foot on the step of my own door, a telegraph messenger placed a telegram in my hand from the younger surgeon: "Your hopeful prediction fulfilled; patient conscious; please return at once." I returned to find the man I had left for dead sitting up in bed, the circulation through his lower limbs so entirely suspended that he could not feel any touch or pinch, but his mind clear and his heart completely free. He had no knowledge of my previous visit nor of his own danger, but imagined that he had passed through a long and awful dream, in which he had been struggling with all kinds of imaginary foes, human and animal: burglars, horses, bulls, which got away from him when he had mastered them and let him sleep again, feelings, I suspect, that accompanied the convulsive paroxysms. The circulation in this gentleman's lower limbs was gradually restored, and he made a good recovery in every way except, as he told me some years afterwards when he called upon me in London, that he "thought he had never been quite so firm on his legs since that attack as he was before," and that "he had to walk with a stick ever since."

TREATMENT OF VASCULAR OBSTRUCTION FROM FIBRINOUS
PRECIPITATION, BY AMMONIA.

The long experience I have had tells me that the only rational means of treating these critical cases of obstruction is by the free use of ammonia, carried up to the point of causing re-solution of the obstructing

fibrinous mass. I proposed this method in 1854. I have held by it, and I hold by it with every reason, theoretical and practical, in support of the conviction. I have seen other remedies used freely. I have seen alcohol carried to the extreme under the false idea of giving support; I have seen opium administered to relieve the apnœa; I have seen ether, and other so named antispasmodics, administered freely. But all these methods of treatment are mere modes for alleviating the pain of death, and in the matter of alcohol and opium, of really expediting that event, for alcohol quickens a heart that should be kept subdued, and opium deadens a heart that should have given to it every chance to live; while neither agent has any useful influence on the blood to resolve it back to fluidity. But in ammonia, and in that alone, there is a true and physically rational remedy. I do not boast of it as a panacea, for I know that it may fail. At the same time, I claim for it that in forms of disease which must have ended in death without its potent agency, it has, explicitly, cured. In evidence of this statement, let me give three illustrations beyond those which in years gone by I have already published.

I.

Dr. Andrew, of Queen's Crescent, Haverstock Hill, summoned me, in haste, to see a lady thirty-two years of age who was lying *in extremis* from what he feared to be arrested circulation of blood through the heart, from deposition of fibrine on the right side. The lady had been delivered of a child twelve days previously, and, owing to placenta prævia, had suffered the loss of a very large quantity of blood. From this loss of blood and from all the other effects of the labour she had seemed to recover. She had experienced no pain, had

slept fairly, and had partaken moderately of food, but had been unable, owing to absence of milk, to nurse her child from her own breast.

On the morning of the 23rd January, while being raised in bed, and while partly dressed, she suddenly fell back, began to breathe with intense rapidity and anxiety, threw out her upper limbs with gasping movements, turned of ashy paleness, and appeared, to use the expression of the attendant, to be struggling with death. Dr. Andrew, who was speedily summoned, found her in this same condition, but a little less restless; her body was cold, her heart was beating with extreme rapidity and tumultuousness, and her breathing was rapid and panting. On my arrival, about thirty-five minutes later, I found the symptoms the same. The patient was still lying, half dressed, on the side of the bed; she was utterly prostrate, and, except for a restless motion of the fingers and hands, was unable to make any voluntary effort. She was sufficiently conscious to answer every question put to her, but the mere exertion of speaking was exhausting. The temperature of her body, taken from the mouth, was 97° Fahr. The pulse, when it was sufficiently evident to be counted, was 120 in a minute. The veins in the neck were full; the cardiac apnœa was extreme, although the air entered the chest with perfect freedom; there was not a sign of asphyxia. She explained, as well as she was able, that she felt no acute pain whatever, but the inability to get breath was the great source of suffering and anxiety.

On examining the chest I found the breathing was carried on by the diaphragm and thoracic muscles in the natural way, and indeed was natural except for the rapidity of it. The heart was beating tumultuously

and apparently with great force, the impulse against the chest wall giving a vibrating movement or thrill, which was communicated to the coverings of the body. On examination by the stethoscope, no obstruction was found in any part of the lungs to the entrance of air, nor any evidence whatever either of bronchial obstruction or of congestion. On percussion the resonance was everywhere normal.

The examination of the heart by the stethoscope yielded the unmistakable symptoms of the existence of obstruction in the right side. The action of the heart was forcible and occasionally irregular, and when the single stethoscope was used the two sounds were heard, the first very feeble, but both unaccompanied by murmur. With the double differential stethoscope it was perfectly easy to distinguish that the first sound was not produced from the right side of the heart in the natural manner, and that the feebleness of sound was due to the circumstances that the sound heard with the single stethoscope depended almost entirely on the tension of the mitral valve, and that the tricuspid was interfered with by the presence, in the right cavities, of some soft and resisting substance. Taking the symptoms altogether, there was no difficulty in confirming Dr. Andrew's diagnosis that the right side of the heart was obstructed by a separation of fibrine which probably had an attachment in the right auricle.

We did not conceal the fact from ourselves or the friends that the promise of recovery was well nigh hopeless, but we determined to proceed systematically towards possible cure, and the course of treatment we pursued was at once prompt and decisive. We placed the patient gently, and without removing any clothing, in the horizontal position, and in that position we

ordered her to be kept in absolute rest. We then commenced to administer the strong liquid ammonia in five minim doses, diluted with iced water or with iced milk, every half-hour without any intermission, and we arranged that milk should be the staple article on which she should be fed. We enjoined freedom from all noise, but allowed the room to be well lighted during daylight. We avoided every act or word that would be calculated to convey the slightest alarm to the sufferer.

On my return visit, after a period of seven hours, I found the patient in the same condition as when I had left her, but I learned that she had taken the ammonia without difficulty, and that it had produced no nausea. The first dose or two had caused a sense of burning in the throat, but by diluting more freely this difficulty had been overcome. The exhaustion was the same, and the rapidity of the breathing was not diminished; the pulse was still 120 per minute and thin in volume. The sounds of the heart remained the same.

On the 24th, in the morning, Dr. Andrew reported to me that the patient had passed fairly through the night. The breathing was a little less rapid, the pulse unaltered. Milk had been taken steadily as food, and the ammonia, which had caused no unpleasant symptom, had been continued.

On the 25th, forty-eight hours from the date of my last visit, I visited the patient again with Dr. Andrew. The treatment had been continued, and half a fluid ounce of the strong fluid ammonia had now been administered. The breath was distinctly ammoniacal in odour, and the urine, which had been passed regularly, was strongly ammoniacal. The breathing was less rapid; the pulse was 115 and fuller in volume. The temperature of the body was precisely normal. The

sounds of the heart were nearly the same as at the last visit, but the first sound, differentiated, was clearer on the right side. The mind of the patient was all through conscious, and she was in as good spirits as could be expected. She complained of the restraint of her position, and, at her earnest request, she was moved by ourselves to a new place in the bed, with her body still perfectly horizontal, the change affording her great comfort. The treatment was carried on as before.

On the following day at the same hour the symptoms which had given so much and necessary anxiety were clearly on the decline; the breathing was greatly relieved, the pulse had subsided to 110 in the minute, and the first sound of the heart was nearly restored in fulness. The only notable change was that the temperature of the body had risen a quarter of a degree. We found no cause of a local kind for this change; the mammæ were flaccid and free of pain; the uterine discharges and the uterine conditions were, as they had been all through, quite natural.

We determined at this visit to administer the ammonia every hour, instead of every half-hour, and we permitted some slight modifications of diet: a little soup, and if she liked it, minced cod-fish.

On the following day Dr. Andrew observed a further increase of febrile heat, and on the next morning I was informed that the patient was suffering from great pain in the left ankle, with some swelling of the limb. I made a visit with Dr. Andrew late in the day, and found the breathing entirely natural, the heart sounds quite free, but the tongue slightly loaded, and the temperature up to 101°. There was great pain in the left leg, the limb was swollen up to the calf, and there was a red erythematous blush on the surface.

There were also occasional flying pains in the other limbs. The skin generally was of dusky hue, and the conjunctivæ yellow.

I had prognosticated the possible occurrence of these symptoms, and we were therefore prepared for them. They were for a time troublesome, but they gave us less alarm than they would have done had not experience of their nature and course been in our possession.

The short febrile attack, which I consider to have been due to the circulation through the blood of the resolved fibrinous coagulum from the right side of the heart, was the last feature of this very interesting case. The swollen limb subsided gradually to its natural size, and the fever, never very pronounced, was of short duration. That the patient was left exceedingly anæmic and exhausted was to be expected, but she gradually regained power, and made a perfect recovery.

II.

I will now briefly relate another example of a similar order, but different in detail, from the circumstance that the obstruction was in the veins and not in the heart.

The patient, a young married lady, was subjected to an acute febrile attack, which was induced, as was believed, by the inhalation of septic poison. The symptoms at first were those of continued fever, but were followed by indications of pain extending down the right thigh and leg. One of our industrious and distinguished brethren, whose early loss we greatly deplored, and who was called in to see this lady, found the femoral vein obstructed along the whole of its course by firm coagula. The vein was much distended by the consolidated masses within it. There was fulness of the veins on the lower part of the limb, and extreme

tenderness along the whole limb, increased by pressure. Reckoning from the time when the exposure to the septic inhalation took place, these changes began on the fourth day of the disease. Two days before there had been a rigor ; on the preceding day the temperature of the body had risen to 103° Fahr., and the pain of the limb had commenced. On the fifth day, the day on which I was called in, the temperature of the body was 104° Fahr.

The ammonia treatment was at once commenced by the administration every hour of one fluid drachm dose of the aromatic spirit of ammonia, with perfect rest, and exclusive milk diet. The husband of our patient, being himself a practitioner of medicine, carried out the treatment with the utmost precision. The amount of the aromatic ammonia spirit exhibited was never less than three fluid ounces in the twenty-four hours.

Soon after the commencement of the administration of the ammonia the temperature began to decline, and on the third day after the commencement of the administration it had fallen to 100°; it then rose gradually to 103° until the sixth day of administration, and again declined until the eleventh day of administration, when it was normal. On this day we noticed for the first time, that the coagula in the femoral vein had commenced to soften, that the knotted swellings of the vein were subsiding, and that the pain from tension was somewhat relieved. On the evening of the same day the temperature rose to 102°, and on the following morning to 104° Fahr. For three days it slowly declined to the normal, and then rose to 101°, at which it remained for three days. By this time the knotted condition of the vein was gone, and the embarrassment in the circulation of the limb was removed, but with occurrence of secondary mischief from the transference of the resolved

fibrinous deposit into the pulmonary and general circulation. There was now diffuse pneumonia, as the older masters would have said, quick breathing, constant cough and crepitation, and systemic symptoms of pains in the limbs,—septic rheumatism.

For these symptoms, incident to the resolution of the separated fibrine, I was quite prepared. I was conscious from the continued clearness of the sounds of the heart that no large mass of solidified fibrine was in the heart, and I inferred from the general distribution of the symptoms that the fibrinous mass had been resolved.

This critical stage of the disease was attended naturally with a rise in temperature. On the day of complete solution of the clots—sixteenth day of administration of ammonia—it rose to 104°, the next day to 105°, the next to 105°, and the next, when all the secondary systemic mischiefs had reached their height, it had risen to 106°.

The condition of the patient at this period of her illness was sufficiently typical. To our predecessors it would have been a hopeless obscurity; to ourselves it was clear as daylight. There was now active diffuse pneumonia, with cough, rusty sputa, and oppressed breathing. There were pains in the limbs and occasional rigors; there was slight yellowness of the skin, and there was diarrhœa. The possible danger that lay before us was, that within the circulation there would be a second separation of fibrine in the semi-solid form, a mechanical obstruction, and sudden dissolution.

I was not myself afraid of this danger under the existing circumstances, for the blood of the patient was fairly under the solvent influence of the ammonia. I removed a little blood by puncture with a needle, and found it incapable of rapid coagulation, and I detected

in the disintegration of the corpuscles that our remedy was in active operation.

At this time sixty ounces of the aromatic solution of ammonia had been administered. It had not, so far, produced one unfavourable symptom. I urged, therefore, its steady continuance, on the ground that it was solvent in its action, and, by its power in arresting the decomposition of plastic organic matter, was preventive of the formation of the secondary products of decomposition, which so often cause death.

Under the continuance of this treatment recovery took place. The temperature began to fall, maintaining from the twentieth to the twenty-third day of the ammonia administration a mean of 104° . On the twenty-fifth day there was a sharp temporary rise of temperature to 106° , with evidence of a localised accession of mischief in the left lung, followed by the expectoration of purulent matter. In the morning of the succeeding day this accession ceased, and for the next five days there was gradual decline down to the natural standard, with improvement of symptoms generally and convalescence. The quantity of ammonia was now cautiously reduced, until the complete absence of all symptoms led to its total withdrawal.

The amount of aromatic spirit of ammonia administered through the whole period of administration was three fluid pints and fifteen fluid ounces, yet the recovery upon the withdrawal of the alkali was rapid and sound. The patient since her recovery has passed naturally through three pregnancies and has given birth to healthy children. It is worthy of notice that after the few first doses of the ammonia, which was usually administered either in iced water or milk, the difficulty of swallowing it passed away altogether. I should add

also, that it produced no nausea, nor any other symptom that forbade its continuance, although it rendered all the excretions strongly ammoniacal. The breath was at all times ammoniacal.

III.

In the third example of treatment under the ammonia method the final result was different, but the facts are not less instructive.

The patient was a woman past the middle term of life, upon whom Mr., now Sir Spencer Wells, had performed the operation of ovariectomy. The operation presented no peculiar difficulties, and for eleven days the patient made satisfactory progress. On the twelfth day she showed an elevation of temperature, and during the following two days there was evidence of embarrassment of the heart. At Mr. Wells' request, I saw this patient with him, and, by his kind courtesy, I was enabled to watch the case until its fatal termination—for the case ended fatally—and to take part in the post-mortem examination. I understood that my earliest visit on the patient was made on the fourteenth day after the operation. The wound, I was informed, had nearly healed, and was nearly free of discharge. The temperature of the body was 104° ; the breathing was hurried, and the rate of the circulation one hundred and twenty pulsations per minute.

On auscultation I detected no obstruction to the respiration, and indeed no pulmonary mischief of an organic kind. The heart presented precisely the same condition, in respect to its sounds, as in the first case I have described. The first sound was imperfectly pronounced, and the obscurity was due to a deficient sound from the tension of the tricuspid valves, owing to

the resistance of some soft impeding substance in the right cavities. My diagnosis was, separation of fibrine commencing in the auricle, extending downwards into the ventricle, and probably crossing the free margins of the tricuspid valves. At my suggestion, this patient was put fully under the ammonia treatment, five minim doses of the alcoholic saturated solution of ammonia every half-hour in iced milk. To this was added, perfect rest in the horizontal position and milk diet. The effect of the ammonia was just the same as in the previous examples in respect to its action upon the blood in the heart and the liberation of the heart from the impediment within its right cavities; but in the course of a few hours after the administration had commenced symptoms of a cerebral character were developed. The temperature rapidly rose to 106° Fahr.; there was tendency to coma, convulsive movements during sleep, and finally all the symptoms of effusion at the base of the brain. Still the patient continued to live for four days, during which period the first sound of the heart regained its natural quality of tone. She died ultimately from coma.

In the first case of fibrinous separation within the right cavities of the heart in which I administered ammonia in large doses, the death occurred in this selfsame way. I thought then that possibly the death might be due to the toxical action of the ammonia, and so impressed was I with this notion, that I allowed many years to pass away without returning to ammonia for treatment. The experience gained was, however, not lost, for it taught me two great lessons: (a) that in the absence of treatment all these cases are fatal: (b) that death sometimes will occur from coma when no ammonia is administered at all: and that the cause

of the coma is an extension of the original malady, a separation of fibrine in the cerebral sinuses.

In this case, therefore, I diagnosed, when the coma supervened, that there was a separation of fibrine probably in the lateral sinuses, and that the obstruction induced was giving rise to pressure from exuded fluid. I further diagnosed that the clot in the heart would be found in course of solution if not entirely resolved.

The post-mortem examination disclosed the correctness of this diagnosis. The right side of the heart was found containing fluid ammoniacal blood with some thin layers of plastic matter adhering to the auricular walls; and in the lateral sinuses were two long cylinders of purely separated fibrine, completely occluding the vessels on both sides. A large quantity of effused serum was also found at the base of the brain. The death, in this case, was due to the masses of fibrine separated in the cerebral sinuses, and which, less accessible to the solvent action of the alkali than the clot within the heart, were not resolved.

The three illustrations I have described are typical, but not selected. They simply tally with similar illustrative cases I have already reported, and with others which in a similar but less striking manner have come under my observation. I dwell upon them because two of them demonstrate the possibility of actual cure in what, according to my judgment, would be altogether hopeless cases under any other mode of treatment.

Ammonia as a curative agent is at once physiological and rational in its action. It is not given because it is a stimulant; but it is given because, when it is efficiently administered, it resolves fibrine that has been precipitated in the semi-solid form, retains the fluidity

of blood, and plays, in the most perfect manner, the part of an antiseptic. In addition, its volatility, diffusibility, and solubility are all in its favour. It enters the blood rapidly, it diffuses rapidly and equally, it sustains fluidity, it retards putrefactive changes; and, whenever the practitioner wishes to suspend its influence he has only to withhold it for a few hours, that the end he desires may be ensured. In this lies the advantage of liquid ammonia over a salt of the alkali.

Administration.

1. The ammonia is best administered either in the form of the strong aqueous solution or of the saturated alcoholic solution. More than five minims at a time cannot easily be swallowed. The best menstruum for the ammonia is milk, and if the milk be chilled by ice, the patient takes the mixture with great facility.

2. The ammonia must be relied upon exclusively. Sedatives of all kinds are to be avoided as fraught with danger. Wines and spirits are most injurious; they produce a danger of movement of the fibrinous mass, they excite, and, in time, exhaust the heart.

3. The diet should be, as nearly as possible, of pure milk, with an occasional change to gravy soup or minced cod-fish, with bread or toast. Other solid substances do not digest readily; they create flatulency, and cause a restless movement of the body, which is detrimental.

4. With the medicinal and dietetic treatment thus enjoined there must be combined the most perfect rest of the body in one position. The secret of success consists in producing solution of the obstructing mass while it lies sufficiently out of the course of the circulation. If it loosen from its hold and be carried into the pulmonary artery while it remains semi-solid,

however small it may be, it will be a source of fatal danger.

5. Together with this physical rest every mental rest, every mental comfort, must be supplied. The patient must be harassed with no unnecessary fears, agitated by no unnecessary comments. Much of the success of the treatment depends on the gentle firmness with which the practitioner enforces that the greatest advantage is secured by absolute repose of the mind as well as the body.

6. When the secondary changes indicate the solution of the fibrine and its distribution over the vascular system, the administration of the ammonia is not to be withdrawn. The alkali is indeed as important under these circumstances as in those which precede them.

7. The conditions warranting the withdrawal of the solvent are: entire subsidence of the difficulty of breathing; relief of the tension of the veins; returning fulness of the pulse; normal temperature; restored mental and physical power; and steadiness of motion of the heart, with perfect clearness of the sounds. When these favourable conditions are proclaimed it is fair to infer that no obstruction is present in the circulatory canals, and that the ammonia may be withdrawn.

But inasmuch as the ammonia, however far it may, with reason, be carried, does no injury that is not quickly recovered from, there exists no cause for hurry in withdrawing it. It may, therefore, be continued in less frequent doses for a few days when every danger appears to have passed away.

THE PHYSIOLOGY OF HISTORICAL REPETITIONS.

DIONYSIUS of Halicarnassus tells us that History is "Philosophy teaching by examples." Of all the definitions of history, this, one of the oldest, is probably one of the best. It is assuredly the best in a scientific point of view, since it places history in the true light of a natural science. It is as though it said history is the record of phenomena which occur and which recur, so that an example discovered once may be accepted and remembered as something that will be seen again and recognised again like other and more obvious mechanical examples of natural processes.

Lord Bacon conveys in other words the same thought when he says, "History treads the earth performing the office of a guide rather than of a light." He means, I take it, to tell us in this definition that history is a series of examples or signs by which we are led on in natural course to know what are the whole phenomena of the living moving force or light that produces the phenomena. Frederic Schlegel expresses the same thought, yet once more in different terms, when he says, "The historian is a prophet with his head turned backwards:" by which he suggests that the man who has read history thoroughly has seen the phenomena

recorded in history so frequently, he is able to foresee the recurrence of the phenomena or the circumstances under which they will recur.

More forcibly still the same view is maintained, in the words of the writer of that most wonderful of all wonderful essays, the Book of Ecclesiastes; a book which, to my mind, is the unsurpassed of all that is in literature: a book of science of the most lucid character; a book of metaphysics of the most subtle discrimination; a book of philosophy taught by examples of the profoundest wisdom. "The thing that hath been, it is that which shall be; and that which is done is that which shall be done: and there is no new thing under the sun."

The selfsame thought is [conveyed in the common saying, "History repeats itself."

I have quoted the statements of those who rank highest of the highest in authority; but it is also open for me to make reference to yet another authority, which, though in detail lower, is, in combination, the source of the very authorities classed as the highest. I refer to what we may call the experience of intellectual mankind. Whatever may be the secret origin of this experience, it is certain that in proportion as the animal man surpasses the lower animal, and rises, by intellectual superiority, into the light of knowledge, and into that application of knowledge which we call wisdom, he becomes more conscious without any professed special historical learning,—I mean historical learning according to the common acceptation of the term,—he becomes more conscious of the impression that, whatever new thing is brought forth, it is in some sense, according to the order of nature, a something which he is prepared for if not familiarised with, a something that he accepts as if it were old, or as if it

had been done before or had been thought of before. There exists, in fact, amongst the intellectual a mental preparation for accepting the repetitions of history without wonder. Wonder is an emotion of the ignorant.

Before we can discuss the phenomena of repetition it is necessary to see clearly what are the elements of history. In our day we confine the word history too exclusively to what is technically called civil history, that form which Bacon defines as the "works and acts of men ;" while natural history, which the same author defines as "the natural records, the works and acts of nature," is put aside as if the adjective rather than the noun expressed what ought to be understood. This is a mistake of the first order. The two histories are one and inseparable, and their combination under one professorship, as in the chair of civil and natural history in the University of St. Andrews, presents as a mode of expressing the unity a great improvement on the system of division and distinction which now passes current amongst scholars themselves.

On the supposition that civil and natural history are one, the term historical repetition is at once admissible and understandable, because no one disputes that the phenomena of natural history, of night and day, of storm and calm, of seasons, of birth and death, and such like, are repeating histories. These phenomena a man can contemplate and calculate on, apart from the phenomena he himself produces. The great question is, are the works and acts of man of the same order? Is the course of a family or race as definite as that of a planet? Are human affairs conducted in a manner that subjects them to recurrence independently of the man? Is the will of man, seemingly so independent,

no more than a will within a will? Is it directed from without? Is it as definitely under natural law and ordinance as those movements which are so obviously under external governance? In a word, are the works and acts which make the civil history of the world recurring phenomena under fixed law? Is it the fact that "the thing which hath been is that which shall be; and that which is done is that which shall be done"?

From my own observations I gather that there are three schools of thought on this complicated question. There is a school, and this includes probably the greater part of those who are called pure historians, which studies the civil history, the works and acts of man, apart altogether from natural history. To this school man stands forth as an independency, an instrument of self-government, an instrument of self-improvement in the fullest degree. Man is set free from Nature; he is above Nature. He may control her, defy her. The supreme will which ordained the material universe, and which also ordained man, established in its divine wisdom two orders of power. The one is the motion of inanimated matter, mighty and persistent, governed by laws out of the hand of man. The other is the motion of animated matter endowed with self-action, and responsible to itself; capable in its highest form, man, of standing apart from inanimated moving matter and of seeing it move, yet declaring it dead; capable of studying the movements of such dead matter, and formulating them in pages of science, while feeling itself distinct and super-endowed; of writing a history of the movements of the unanimated matter, and calling the record natural history; of writing a history of the move-

ments of animated matter, and calling that civil history; of speaking of the unanimated as nature, of the animated as man.

To this school of thought the idea of historical repetition is, of necessity, a chimera. Why should history repeat itself? Man increases, and as he increases progresses. Man is free to improve in the future,—why should he fall back on the past? If it be that some facts suggest repetition, the facts are due to the circumstance that the man has continued too long inactive in that particular line of improvement. He repeats when and where he might improve, or he continues a practice or an act because it pleases him so to do; because, in fact, he likes to continue it. This school of thought is strong in its beliefs; and civil history, as a special branch of learning, is founded upon it. It is strong because it is satisfactory to the pride of man. It gives to him a principle, a spirit beyond that which belongs to the inanimate matter he sees in motion around him. He is no mere cloud to be wafted by the four winds, to be driven into fantastic form, to be dissolved in tears of rain, or to be riven, as by flash of lightning and clash of thunder, into nothingness. No! These phenomena pass away and repeat themselves. He exists! He can govern even that angry cloud, and make its passionate fire obey his omnipotent behests.

There is another school, to which the majority of educated mankind belongs, which, on the whole, is content to accept the teaching of the civil historian as above stated, but which accepts the teaching with a qualification. It sees so many instances of strange repetitions of work and act in the history of man, it is fain to believe in some stranger and more singular

power, by which, independently of the human will, certain works and acts are repeated. For much that man does he is master of the doing; but not for all. He is sometimes impelled to repeat what has been done. There is a law of coincidences, say the followers of this school, in which they believe, but do not attempt to explain; some midway connection between the repetitions of nature and the free-will of man.

There is a third school, including mostly students of natural history; a very ancient and at all times, so far, a very small and select school, which thinks it can trace everything back to natural law. This school holds that men are deceived when they consider their works and acts as supernatural, or out of the range of ordinary natural governance. It holds that a superior intelligence surveying all human work would detect that such work, like that of external nature, is after a fixed rule with periods of recurrence.

These historians see in civil as in natural history, nothing but repetition. To them history, universal and concrete, is ever repeating itself. Foremost of the school was he who wrote, "The thing that hath been, it is that which shall be; and that which is done, it is that which shall be done: and there is no new thing under the sun."

Between the first and the last of these schools of thought the world of intelligence has been divided from the first periods of enlightenment. The contending views colour every act, every science, every social phase, every religion. The æsthetic joy of the ancient Greek, the melancholic determination of the Jew, are representative extremes of these schools. The

religious ardour which, upholding good works, places salvation in the power of the unsaved ; and the equally religious fervour which, prohibiting the boaster, makes salvation an act of grace and places the act amongst the events that are predestined and out of the reach of the will of the recipient, are again the representative extremes of these two schools of thought.

On the whole, the contentions of argument on these debatable subjects have been carried out by the advocates of the first and third of the schools of thought, both of which, in a numerical sense, have ever been a minor part of mankind. The masses have belonged to those who, caring less for logical precision than for peace of mind and influence, have adopted something from each of the extreme schools, and stood between them. The history of the Church of Rome is a signal illustration of this position. Extolling the doctrine of good works to the actual canonisation of man, and making it dogmatically clear that human advancement to perfection is progressive and dependent on individual perfection wrought out by the human will, this Church declares, at the same time, at every possible opportunity, the changelessness of history, and that "as it was in the beginning, is now, and ever shall be, world without end." The grand division of the Church by which it was once broken occurred at this weak point in its doctrine, and would occur again if the added dogma that the Church is an instrument guided from without by definite rules, and by virtue of a power it cannot control, but which always guides it in the right, were not applied as a philosophical support ; a support used also by that school of natural historians which sees all men as instruments working out, blindly to themselves, the fixed and predestined orders of nature.

In its scientific aspect the truth of the theory of historical repetition as a necessary occurrence, and as a definite occurrence, turns altogether on the questions whether natural and civil history, *i.e.*, the acts and works of nature and the acts and works of man, are or are not the same. If they be the same, then every repetition of history is a part of a design or system which, being fixed, may be discovered so that the future history of man may be foretold with a precision not more wonderful than the foretelling of an eclipse. If they be not the same, then the most striking repetitions of history are due either to accident; or, to the resolutions of men that they shall be repetitions, as when on the stage we see presented to an audience a moving and living picture of something that once has been, and that now, for the moment, by the order of the human will, is re-presented.

We might cast the theory of historical repetition to the winds, in its relation to civil history, if the events of it merely rested on accident, or on the resolution of man that it should be. Is there historical repetition as a part of a natural system, in the working of which we are the instruments, and over which we have no actual control? Is it true that "the thing which hath been, it is that which shall be; and that which is done is that which shall be done"?

I propose to devote a few moments to look at the assumed affirmatives of this argument.

In the history of man, when he is considered as part of the universe, when in himself the natural and civil life are so combined that they become inseparable, the phenomenon of repetition is simple enough and certain enough. The birth of man, his appearance on the planet as a distinct existence, is a sufficient illustration

of the phenomenon. Equally distinct and repeatedly distinct is the death of the man. The death may seem to be varied in detail of mode and form, but it is essentially one phenomenon, occurring always, as we discover, when it is traced carefully to its intimate nature, from the same order of act and process. Again in the most refined construction of the man history is repeated. His qualities of mind, his muscular movements, his colour, his physique, are repetitions sometimes so close that the least observant are obliged to read them, and are never so absent but that the observant are able to read them.

In this repetition of historical fact we touch at once the so-called civil history of the world, that history which is demonstrated by man in his acts and his works. If he be, as he certainly is, influenced by agencies which were in action and in work before he was born, and which are inevitably repeated through time, it is hard to deny that in civil as in natural affairs history repeats itself. That "the thing that hath been is that which shall be; and that which is done is that which shall be done."

When from these repeated qualities we come to the man himself, we see the repetition in those of his acts which make his history, and by multiplication of himself into the world, all human history. The phenomena of sleeping and waking, on which his whole existence, as an active agency, depends, are repetitions as steady as almost any of the repeated phenomena of the movements of orderly regulated unanimated matter. A view has recently been enunciated that in respect to sleeping and waking, there are two definite periods in the twenty-four hours in which sleep and wakefulness naturally fall; a period extending from eight in the

evening to four in the morning for sleep ; and a period extending from four in the morning until eight in the evening for wakefulness ; and that these changes in the times named are like the ebb and flow of a tide in their regularity and order. To my sense as a physician this theory is in accord with all I have observed. But whether it be strictly correct or not it closely defines the limits of two processes which are to all intents repetitions of the history of man ; processes which are so connected with his acts and works, they may be considered the bases of his civil historical life ; processes which are so connected with his civil historical life, that changed in the same man, the character of his career would also be changed, so as to represent the condition under which it was developed and carried out.

The history of man is once more repeated in those acts and works which depend on the possession of special organic parts or structures. Here the refinement of the repetition is such that nothing short of constant familiarity with it could fail to make it the most striking of demonstrations. Take for a single and sufficient example the repeated phenomena of particular singing voices, the soprano, the mezzo-soprano, the contralto, the tenor, the baritone, the bass. In studying these voices, so definitely arranged by historical repetition of a natural kind, the skilful musician constructs the whole of that part of civil human history that is written in song. He could not, indeed, write out of this rule of repetition, tried he ever so earnestly.

It may with great fairness be said that in these illustrations we are dealing after all with the accredited phenomena of natural history, the repetition of which no one denies, and the effects of which, in an indirect

manner, on civil history no one wishes to deny. I feel we may go a step further than this outpost. To ym mind we may take also fairly into our argument the genius out of which all civil history in its practical declarations is prepared. The distinguishing peculiarity of genius is that it is impelled to its action in the person through whom it is developed. I cannot doubt there have been some men of genius so strongly impelled as to be themselves aware of the impulse ; themselves conscious that, in the supreme order and design of nature, they were instruments for unfolding the design ; that they lived not for themselves, but for other and irresistible intents. In saying this I do not mean to imply that men of genius are specially picked out at a special time by some interfering superior governing power for a special purpose or necessity, but that they come in natural undisturbed order of coming, in due time, and probably in revolution of fixed duration, *i.e., in a psychical circle of time*. In other words, they are repetitions of the definite qualities of men, and are repeated because they came into the time and order of repetition.

Again, it is difficult not to believe that universal genius by particular methods is repeated in particular epochs,—now by genius for abstract research, then by applied research or mechanics ; now by poetry, anon by art. At the present moment we are passing through a phase of applied research, derived from the last marvellous century, and are repeating what has been the mind of preceding similar psychical periods. Sometimes we repeat in actual detail, innocent, in the act, of what has been done. Sometimes we repeat in detail not what has, perhaps, been precisely done, but what has been conceived and, owing to the briefness of the period of applied research, left undone.

History is a perfect mine of wealth of these facts when the mode of looking for them is once explained. Let me give an illustration of a rather striking character bearing upon one of the startling mechanical researches of this mechanical era.

A modern genius told us, not long ago, a fact at which the masses wondered. Into an "empty" sphere of glass Mr. Crookes inserted light discs of solid matter, and by bringing the sunbeam to bear on these lightly suspended masses, in direct or indirect mode, he made those discs revolve. This is not the place to enter into the cause of such developed motion. Suffice it for me to say that the observation, on Mr. Crookes' part perfectly original, is one that through the future must always excite an interest of the first order, and if it be lost must revive again. So much for this invention as an independent modern example of human skill. What to us is of special interest at the present moment, is the fact that this invention has been lost, and is once more found. "The thing which hath been, it is that which shall be; and that which is done is that which shall be done." In this invention we see called up again the crystal sphere of Archimedes; the sphere and cylinder, the figure of which Cicero, when Quæstor of Syracuse, long, long after the death of Archimedes, discovered depicted on the tomb of the immortal mechanician: a tomb then so forgotten that men with scythes must needs clear the way that the antiquarian Quæstor might approach the shrine.

The spherical cylinder of Archimedes stands side by side with that of Crookes. Within it both scientists placed small bodies that by some wonderful extraneous power revolved; and so revolved that men of our time might say, as men of old did say,—whether rightly or

wrongly, I do not declare,—that the little sphere is the model of the great, of the earth and the sister planets moving round the central sun.*

In other works, or if not in actual works, in words of genius, the story of historical repetition is equally told. Homer dismisses his loving hero, telling his wife that the term of all the race on earth is fixed, and that not even life is antedated, though an enemy be at the door. Virgil depicts the pendent earth in space,—“*Aspici convexo nutantem pondere mundum*,”—as clearly as ever astronomer royal drew it on his chart. Isaiah, like a modern sanitary scholar, tells of the period when there shall no more be an infant of days, but when every one shall fulfil his allotted period on the earth. Epicurus discusses the theory of atoms, and denying to the atom the soul or spirit which others had ascribed to it, proclaims the materialistic school which is at this very hour struggling once more to win its way.

* “*In sphæram Archimedis*” did in fact afford a text on which the poet Claudian, penning the subjoined poem, makes Jove himself look down to behold the mortals copying his plans, casting the designs of the gods into mortal mould, and counterfeiting the zodiac.

IN SPHÆRAM ARCHIMEDIS.

Jupiter in parvo cum cerneret æthera vitro,
 Risit, et ad Superos talia dicta dedit :
 Hucine mortalis progressa potentia curæ ?
 Jam meus in fragili luditur orbe labor.
 Jura poli, rerumque fidem, legesque Deorum,
 Ecce Syracosius transtulit arte senex.
 Inclusus variis famulatur spiritus astris,
 Et vivum certis motibus urget opus.
 Percurrit proprium mentitus Signifer annum,
 Et simulata novo Cynthia mense redit.
 Jamque suum volvens audax industria mundum
 Gaudet, et humana sidera mente regit.
 Quid falso insontem tonitru Salmonea miror ?
 Aemula naturæ parva reperta manus.

Shakespeare declares, not less clearly than Newton, that the centre of attraction—

“Is as the very centre of the earth,
Drawing all things to it.”

Milton, in the battles of the angels, invents engines of war which an Armstrong may reduce to shape and structure, but cannot excel in conception of power.

In a word, biographical history is a book of repetitions. It proclaims on every page that genius is cometical; that it lives, in its repeated appearances, as itself and as nothing else; as a rare light passing through the human mental sphere from other spheres, feeding the eternal sun of light, and yet, like the comet of the terrestrial sphere, under calculable law.

We touch the most refined part of our study when we deal with the phenomena of historical repetition through the exalted shadow of genius. We touch the grosser, and therefore the more obvious part, when we descend to those lower phases of human history, which are demonstrated in the instincts and passions. Through these repetition is ever being manifested. In the lower animals the repetition is so steady that their works and acts left uncontrolled may be practically measured as pure problems of calculable natural history. In men of lowest animal construction repetition through the passions is ever perfectly obvious. The phenomena of love, of hate, of greed, of fear, of lust, of pride, of rage, are presented with a regularity which makes the grand result of them in their worst phase,—the crime that results from them,—a measurable quantity from year to year and age to age. So great crimes, great massacres, great murders, great thefts, repeat them-

selves, as great virtues repeat themselves, and as great revivals in science, art, learning, and religion.

From its application to the acts and works of man the law of historical repetition extends to the accidents in which he is involved, but in the production of which he plays no voluntary part. To that condition of mental aberration to which we give the general name of insanity the same rule applies with full force. Each form of this disease is an historical repetition so clearly defined, that a few months of office in an asylum reduces all the phenomena to a few well known and distinct classes. The same rule is in force in respect to common diseases. I can find no such thing as a new disease. I can find no evidence that any one disease has been uprooted. Long intervals of time elapse sometimes between the recurrences of a particular disease, but the recurrences are a mere matter of time, and are governed, as it would seem, by some unknown but definite law. The periodicity of disease is one of the strongest evidences of the rule of historical repetition.

If, then, all the mere natural acts of life are historical repetitions ; if the vital organic acts are the same ; if the acts which distinguish men in their artistic lives are the same ; if genius be a repetition ; if the products of the passions be a series of repeated acts ; if the accidents by which we are affected, and the morbid not less than the healthy states of the body come in periodically recurring order ; then the fact that history repeats itself stands forth as an ultimate fact that must be accepted, though it may, at present, like the attraction of gravity, be beyond explanation.

The mind of man has not rested at the discovery of this induction. It has endeavoured to explain it. It

has been argued that all history is developed, according to physical conditions, and that each age, each race, each family, is moulded into its state and historical character by the nature of the forces and materials through which it has been moved and served; and, it may be true that much of the history of a people is dependent on the character of the natural foundation on which the race has been constructed and on which it has survived. But this theory does not explain the recurrence of those manifestations of repetition which stand quite apart from corresponding conditions, and which unite men who are separated by ages of time, by differences of language, by every possible variety of social condition.

The simpler theory seems to me to be that a certain number of elementary types of men exist,—moulds of men if I may so say,—and that these types, so long as they remain permanent on the earth, reappear in regular order of time, practically the same men again, thinking the same thoughts and doing the same deeds.

This theory explains the facts, but of itself it is not a sufficient explanation. To carry it to its end it is necessary to conceive a reasonable mode of connection between man and the force we call *will*. If *will* be a mere emanation proceeding from the living organisation, then the theory of historical repetition as a physiological necessity is a fable, and the pure materialistic reasoners have their way untrammelled. But suppose that the force which we call *will* is not an emanation from living beings. Suppose that it exists, as light and other heavenly forces, do outside ourselves, and acts through life according to animal cast and condition, then the theory of types explains all the pheno-

mena. Then we are moved to action by a power that is indeed higher than ourselves : then the mere organised part of ourselves, the instrument, the body, a compound instrument of many parts, is after all the instrument, improvable but destructible, destructible but immortal.

This theory has one more advantage, above all others important. It links universality of law, even in history, with human progress. It sustains the cherished belief of a principle, connected with animal life, which acts as a distinctive spirit through life. It explains the differences betwixt men of different constructions, betwixt man and animals of lower types, and betwixt the lower animals themselves.

I am not so vain as to falsify my argument by putting forward the views I have advanced as new, for they are all contained in the saying, " The thing that hath been, it is that which shall be ; and that which is done is that which shall be done ; and there is no new thing under the sun." But in these days of vanity, when men think that they themselves are prime forces, suns, and moons, and stars, and gods, it is not out of place for us children of nature to repeat and enforce a text embodying an ultimate fact in natural ordination.

AMBROSE PARE, AND THE BIRTH OF FRENCH SURGERY.

“And let this be the bond of this our immense labour, and by God’s favour our rest : to Whom Almighty, All-powerful, Immortal, Invisible, be ascribed all honour and glory for ever and ever. Amen.”

HESE are the words with which Ambrose Paré, commonly called “The Father of French Surgery,” closes his one and great work,—the work by which he lives through the ages ; a work full of curious passages which unintentionally depict its author, and from which, though it narrates no life in set form, a life could so easily be written, that in this memoir it alone has been the main trust and authority.

The quotation supplied above, when taken with the date of the era in which its writer flourished, 1517 to 1590,—era including and overlapping that of Vesalius, and just including the commencement of that of Harvey, —tells a great deal respecting the man. It proclaims a man conscious and proud of his own labour, “our *immense* labour ;” it proclaims a man who, relying on a power beyond his own power, is prepared to lay himself in the eternal sleep, “by God’s favour, our rest ;” it proclaims, as with a last breath, a Protestant,—a Protestant of the grand unyielding Michael Servetus



Ambrose Paré,

COUNCILLOR OF STATE AND SURGEON-IN-CHIEF
TO HENRY III. OF FRANCE.

school, who, setting at defiance the fires of Romanism and of Calvinism with equal contempt, worships only the God "Almighty," "Immortal," "Invisible." Lastly, by the use of two words of the same import,— "Almighty," "All-powerful,"—it proclaims a man of redundant speech and expression; one whose words and acts flow over; whose soul is as a gorge which rushes from the mountain side, and which men stand at a distance to see and fitly admire.

The sentence is the man.

Ambrose Paré, more than once, appears on the stage of the player,—that life, in miniature, of men and things. The fact is not surprising, for his life adapts itself to every picture. It was a life of romance, of adventure, of brave deeds, of active pursuits, of experience, of courage, of danger, of literature, of art, of science. It was the life of a man who could travel, ride, converse, draw, write, observe, be merry, be grave, give command, obey, encamp with soldiers in the field, luxuriate in palaces with emperors and kings, work in a laboratory, compound medicines, invent instruments and appliances, superintend workmen, cut off or set limbs, extract weapons from wounds, deliver women with child, embalm the dead, assume disguise, play with consummate skill the art of the barber, tell a rattling story, do any act of kindness to any child of humanity however poor or lowly, take part in war denouncing it all the while as the curse of curses, love his own career and yet be ready at any moment to die for his own solemn opinions, worship his own work and yet be generous in the appreciation of others' work, be industrious to a fault, doing oftentimes to-day what he ought to have done to-morrow, and still finding so much time for recreation and repose as to live to a

comely age, and out of all the shifts and shadows of continued contest emerge into immortality by a happy death.

Such, in brief, was Ambrose Paré ; one of the glories of mighty, beautiful, sorrowful, rejoicing France, at a time when her people tolerated untold oppressions, because they had not learned to taste the blessings of freedom ;—France under the heel of apostolic princes, popes, priests, and punishments.

Out of such a life it would be an easy task to select fifty themes, but here, Asclepiad bound, Ambrose Paré as a light of surgery must be *the* theme ; and, indeed, it is naturally so, for he, Paré, was of all things a surgeon, whose hands were ever the powerful servants of his intellect,—a surgeon born, not made.

EARLY LIFE.

A little school book, read in the academies of France in this day, and a truly delightful essay for scholars of all ages, written by Eugène Muller, tells how the Father of French surgery commenced his career.

In the early years of the sixteenth century, and beginning of the reign of the first absolute king of France, Francis I., there lived in the outskirts of Laval, a town in the old province of Maine, now forming the department of La Mayenne, a joiner by the name of Paré. This poor man had brought up two sons and a daughter, and finding himself advanced in age, felt he was not in much of a condition to pay expenses for his last and dearest offspring, young Ambrose, a boy of great intelligence, of active and penetrating wit, and of ardent ambition to learn, born to him in the year 1517. The father was advised to encourage, according to the amount of his means,

these fortunate inclinations of the boy, who, at the little schools in the town, learned to read, write, and calculate. To open a larger horizon to this young and inquiring mind, M. Paré sought a master and found one in a chaplain named Orsoy. "You wish your child to learn Latin," said this ecclesiastic. "Very well; I will teach him." "In return," replied the joiner, "the child shall give you all the little services that he is in a condition to render." And the bargain was concluded.

Of the two other sons of the joiner, the second only had embraced the paternal occupation; the other, the eldest, had become a barber-surgeon, and had a shop at Vitré. The daughter was married to a master-surgeon, who practised in Paris. The family was thus already connected with surgery, but in two different ways which deserve exposition.

Those who practised then the art of healing the sick were divided into three distinct classes. The first was the solemn faculty, the grand body of physician doctors, who, rightly or wrongly, through the clouds of their learning or by their ignorance, had become the laughing-stock for the wits of the day. These physicians only obtained their title of doctor after long studies in ancient texts, and after many examinations in Latin; and convinced that they possessed intellectual ability in its highest acceptation, they considered another class called "master-surgeons" singularly inferior to themselves, and traditionally and legally subordinate. Not facing, but studying maladies from a theoretical point of view, these doctor physicians made few anatomical studies exacting a manual application. This they left to the care of the surgeons, who became a species of workmen, relatively degraded by their

work, and, in some measure, servile. They were not allowed to practise, except after having submitted to examinations which the doctors made them pass, and after having submitted a thesis in Latin. The diploma of master-surgeon, which they then received, forbade all purely medical practice. They might operate, patch up or dress wounds; but they had no liberty to write a prescription as a doctor would; they ought, in a case of necessity, to humbly fetch to the patient a physician, who alone had the right to formulate a prescription.

The master-surgeons who held diplomas formed a brotherhood, who were placed under the protection of Saint Côme, and who, on their side, as if in revenge, did not fail to be singularly jealous of their rights and privileges. Beneath this brotherhood, in a state of well-marked inferiority, came a corporation of "master barber-surgeons," who, with the art of shaving, practised what was called inferior surgery,—the treatment and dressing of boils, anthraxes, and bruises. To obtain the diploma of master barber-surgeon, it was necessary, while having the title of apprentice in the house of a barber working in a shop, to follow at the school of St. Côme a course which made a surgeon, limited to the art of treating tumours and superficial wounds. Of medicine, anatomy, and surgery, properly so called, not one word was taught, for these arts were thought useless to the barber.

Ambrose Paré! why should he not aspire? Instead of remaining a barber-surgeon in a little town, like his brother, why should he not become, like his brother-in-law, a member of the brotherhood of Saint-Côme? The first step was taken—he was to learn Latin, the language which was the key to all serious studies, and without which no examinations were

possible, no diploma in prospect. The chaplain Orsoy, however, understood the duties of a teacher in a very singular manner. Whatever was the good-will with which the child strained himself to make progress under such a master, the parents were not slow to discover that he could only acquire there the training required for a gardener or a groom; he must consequently renounce the surgeon's diploma, and, as his tastes seem to carry him towards the vocation, he must remain a barber-surgeon like his brother, who, after all, being well established, gained his livelihood in a very honourable manner.

On this reasoning, which was not without wisdom, the joiner placed his son as an apprentice to one M. Vialot, a barber-surgeon keeping a shop in the town of Laval. There for some months the child, whose activity and docility were his principal virtues, commenced to put his hand to the elementary practice of his profession. He learned to shave, and, in time, to bleed, to dress slight wounds,—acts which did not give him a high opinion of the career he had entered upon, nor point out distinction. But while with M. Vialot, and while yet a boy between twelve and thirteen, Ambrose was taken to witness an operation by a famous practitioner, who astonished all the assistants by his precise knowledge, and by the certainty and dexterity of his hand. On returning from this scene, the barber said to the apprentice :—

“Thou hast a very peculiar expression; I really think I did wrong to take thee with me; it has overwhelmed thee; thou art too young.”

“Young! Oh, no. No, master; on the contrary, quite the contrary! One day I shall become full surgeon, master,” replied Ambrose, raising his head very high.

"Surgeon! But, poor child, you do not know Latin."

"Latin! Latin! As if Latin had anything to do with the thing we have just seen! As if all the merit of this great surgeon was not in his knowledge of the human body, and his skill in the use of his instruments!"

"Very good; but Latin is necessary for the theses."

"*Eh, mon Dieu!* I shall learn Latin."

"Alone?—you cannot; you must pay for masters."

"Then," cried Ambrose; "I shall pass them over."

Master Vialot shook his head. "The child is unreasonable," said he to himself; "it is of no use to discuss the subject any more with him."

This account of the first step of Paré towards fame tallies with his own account of it in later life:—

"I was but twelve years old when this appetite was awakened within me; seeing and recognising, after a difficult and skilful operation of which I was a witness, how useful and helpful was the science of surgery. It appeared to me to be beautiful and best of all things to work thus for the relief and cure of suffering. From the moment when I promised myself that this shall be the task of my life, the desire and pleasure to be useful was my principal aim; and since then I have always moved towards that end. I left my country home haphazard, trying to support myself by doing my best in the houses of the master-barbers in the provinces. Whenever I had an instant in the daytime, taking the time from sleep during the night, I read, I studied, and, above all, I never lost any opportunity to observe all that had reference to the formation, to the mechanism of the human body. But in the provinces books are rare; the patients of my masters only came to consult them

about insignificant evils, and were not sufficient subjects for study. I was anxious to see true surgery ; so from town to town I wandered, until able to reach Paris. There I was still obliged to enter as an apprentice in a shop. In the hours we were allowed to leave the master to be present at the conferences of the College of Saint Côme I found a centre to my tastes ; but so little was taught to the poor barber apprenticed surgeons that were to become masters, we could only possess ourselves of some dressings and some incisions. Soon these meagre lessons did not suffice for me. Always reading and studying and showing some element of knowledge, I succeeded in getting admitted as clinical clerk to the Hôtel Dieu. There I resided three years, and there saw a great diversity of patients who were treated there. I was able to see and to know the corruptions and the evils of the human body, and at the same time learned, on an infinity of dead bodies, all that can be said or considered in order to arrive at the knowledge of the great secrets of chirurgery."

THE BARBER-SURGEON.

At the age of nineteen Paré was rewarded. One day he came from the College of Saint Côme, reading as he walked something that was written on a leaf of parchment which he held unfolded in his hands. A friend, a clerk of the University, drew near, and asked, "Is it accomplished?" "*Mon Dieu!* yes, see, the soonest possible." And the parchment was placed open under the eyes of the chance-comer, who read:—

"Whereas,—before us, Regent-doctors of the Faculty of Medicine of Paris, Ambrose Paré has presented himself to be heard, examined, and proved, on the theory and practice of the different operations of the profession

of barber-surgeon. After having proceeded to the hearing, examination, and experience of the aforesaid ; after having seen and considered his replies, we have declared and do declare him apt and sufficient to cure boils, anthraxes, bruises, and carbuncles ; and in consequence we have conferred upon him the title of master barber-surgeon, so that to him may be admitted the profitable rights of this title."

To the congratulations of his friend, who predicted great success for him in the position of barber-surgeon, Ambrose replied, "It is a title which in time of need may be useful ; but it is a first step, nothing more."

The newly-designated barber-surgeon did not, it would seem, wait long for employment. He soon found work in the army, and, as he records himself in his "Apology : A Treatise concerning Divers Voyages or Travels," he was sent as an army surgeon, in 1535-36, to "Thurin," to serve under an officer, Colonel-General De Montain, commander of the foot soldiers, whom he (Paré) had treated for a slight illness, and who had formed a high opinion of his knowledge. Montain arranged that Paré should follow the army in the position of surgeon or assistant-surgeon, and he was away from Paris for two years. At first he was occupied at the passage of arms at Suze. Several were killed or wounded. One expression at this eventful time gave the young chirurgeon great fame. A captain, named Ralt, received a gun-shot wound in the ankle-bone of the right foot, so that he fell to the ground. Coming under the care of Paré, he recovered, whereupon Paré made the remark which has been adopted as his motto, "I treated him, God cured him." The French entered the town *en masse*, and Paré was greatly distressed by the horrors which he saw now for the first

time. He entered a stable to put up his horse, and found there four dead soldiers, with three others leaning against the wall, their countenances frightfully disfigured. They neither saw, heard, nor spoke, and their clothes were still on fire from the powder from the cannon which had burnt them. While he was looking at them, one of their old soldiers came in and asked if they could be cured, and, as soon as Paré replied in the negative, drew near to them and quietly, and without anger, cut their throats. Paré called him, indignantly, "a bad man." He replied, that he prayed to God if he were in a similar condition that some one would be found to do the same office for him, so that he might not be left to languish miserably.

At that moment Paré wished he had never left Paris, but he was led on to the siege of the Château Villane. The besieged fought well, and killed or wounded so many that surgeons were much needed, and he, Paré, who was quite a novice, made his first mark. He had read in Jean de Vigo—a Genoese surgeon, at the end of the fifteenth century—that gun-shot wounds contained a poison which was in the gunpowder, and that oil in which the bark of the elder-tree had been digested should be poured, scalding hot, into such wounds. He found also that this was the accepted line of practice, and that, in spite of the agony of the patients, the oil was poured into the wounds as near to boiling heat as possible. He commenced as the others, much to his after-regret, to pour in the boiling oil, but once, not having sufficient oil, he applied in its place a mixture of the yolk of egg, oil of roses, and turpentine. That night he could not sleep from the anxiety he felt in case he, from omitting the heated oil, should find his patients empoisoned. He

rose very early in the morning, and to his great relief he found that those to whom he had applied the cold mixture felt very little pain, and that their wounds showed neither swelling nor inflammation; they also had slept well during the night, while those who had been treated with boiling oil were in great agony, and were suffering from fever, with swellings formed around their wounds. Thus he demonstrated that gunpowder was not poisonous, and promised himself, with great mental relief, that he would never again scald the wounded men. The other surgeons, in spite of evidence, continued to victimise the wounded, their opinion being that as the ancients treated them so they should not change anything; and they made of Paré's treatment a jest.

Soon after these events the Marshal de Montain sickened from "hepatical flux," for the treatment of which a famous physician had been summoned from Milan. This physician, whose name is not supplied, was much surprised at Paré's skill and wisdom, and spoke of him to the marshal as a surgeon young in age but very old in knowledge and experience. "Take care of him," said he, "for he will do you service and honour;" and no doubt the marshal would have remembered the injunction, but death cut short all his labours.

Declining to accept the post he held under the marshal who followed Montain, much lamenting the loss of his first friend, and wishing for time in which to digest what he had learned in the campaign, Paré returned to Paris to open once more a barber-surgeon's shop,—for the dignitaries of Saint Côme would still not permit him to practise as a master-surgeon without undergoing the Latin test,—and for five years he, by repute a fine surgeon, but by qualification little more than a barber, continued in Paris undergoing persecution from

those who were more favourably circumstanced as the brethren of Saint Côme. During this interval, and at the age of twenty-four, he took to himself a wife, and thereby attained to a domesticity which was throughout prosperous, congenial, and happy.

He was settling down in modest contentment to his lot, when his career was changed once more by war. The French took up arms against Spain, the nobles collected their forces in order to serve their king, and Monsieur de Rohan, a lord of Breton, caring nothing about the qualification or the brothers of Saint Côme, attached Paré to his company, the will of the great lord being of itself a diploma for the young chirurgéon during service, in those days of absolute nobility. This service in Brittany lasted some months, for which on leaving for Paris to rejoin his family, Paré received fifty ducats, two horses, and a diamond of thirty crowns. In the same year he went again with De Rohan to Perpignan and from that time for twenty-three years was on and off with the army practising surgery and collecting experiences which are as useful to the historian as to the biographer.

At Boulogne, where he encountered English soldiers, he learned several useful hints, specially on injuries produced by the force of the wind caused by a cannon ball. One day, from tower of "Order," the enemies fired a ball at some French officers, who were talking together. The ball hit none of the officers, but one of them was so struck by the wind that the outer part of his thigh became black and blue, so that Paré had to dress the part and make "divers scarifications to evacuate the contused blood." He himself also, in one instance, being moved by the air agitated by a cannon ball, ducked his head, at which the soldiers

laughed because the ball had already passed him. Here, too, Paré signalised himself, in an eminent degree, by an operation on one of the greatest warriors of the time. The famous Duke de Guise was hurt with the stroke of a lance, "which above the right eye, declining towards the nose, entered and passed quite through on the other side between the nucha and the ear, with so great violence that the head of the lance with a great portion of the wood was broken and remained within in such sort that it could not be drawn out but with great force, yea, with smith's pincers." But, as Paré usually expresses himself, "by the help of God my said lord was cured," the cure being followed by a cicatrix which obtained for the duke the sobriquet of "Balaféré," the scarred.

Between the year 1545, when the expedition to Boulogne was carried out, and the year 1552, Paré seems to have lived in Paris, and to have been busied in practice, still as a barber-surgeon. He had now attained such fame that Sylvius de Boe, the anatomist, invited him to dinner; and, impressed by his knowledge, suggested to him to write a book on "methods of treating gun-shot wounds, and wounds from other arms, such as arrows and lances." The suggestion, favourably received by Paré, was the cause of a storm of opposition. That a barber-surgeon should dare to write a book! But the book was written, and met with so much success that a second edition was soon demanded.

In 1552 the second edition appeared, and not long afterwards its author was away again with the army under De Rohan as surgeon to a company of fifty horse. Paré calls this the "Voyage of Germany." From thence he proceeded to Danvilliers, which his

king, Henry II., besieged. Here, our surgeon records, he amputated the lower limb of a wounded man "*without applying hot irons*," using, that is to say, the ligature instead of the cautery, and the camp being broken up, he and his patient returned to Paris together. "I dressed him," says Paré, "God cured him; and I sent him to his house, merry with his wooden leg, and content, saying that he had escaped cheaply not to have been miserably burnt."

Later on, in the same year 1552, Paré was away once more to the wars. King Henry II. had levied thirty thousand men to make spoil about Hedin, and the King of Navarre, as chief of the army, sent for Paré and pressed him to follow him. The surgeon cried excuse, his wife was ill in bed. "There are," responded the chief, "physicians in Paris who can cure her, and I have left my wife, who is as well descended as yours;" so he commanded that our barber-surgeon should be attached to his company. The campaign ended in the taking of the Castle of Compt, after which so greatly had Paré distinguished himself that his chief sent a gentleman to King Henry, "who told the king," Paré modestly declares, "more good of me than there was by half. Then the king said that he would have me into his service, and commanded Monsieur de Goguiet, his chief physician, to write me down as one of his surgeons in ordinary, and that I should go meet with him at Rheims within ten or twelve days, which I did, where he did me the honour to command me that I should dwell near him, and that he would do me good. Then I thanked him most humbly for the honour it pleased him to do me in calling me to his service."

Following upon this campaign, Paré was sent into

Metz under most peculiar circumstances. The town was besieged by the troops of the Emperor Charles, and news reached the French King that his forces within the city were being poisoned by the drugs used for the cure of the wounded. The Duke de Guise, six other princes, and a large garrison were thus endangered, and the king, anxious to save them, sent Paré with an Italian captain as guide, an apothecary named Daigue, and as many drugs as a post-horse would carry, to endeavour to steal through the enemy's lines by night and enter Metz. When they neared the lines Paré found a league and a half of bright fires around the city, and "wished himself at home at Paris, for the imminent danger he foresaw." But by good fortune and skill he and his assistants got in safely, and soon the great work of the skilled surgeon played its useful part. There was no truth in the rumour about poison, but under the extreme cold and bad attendance the officers and men were dying very fast, until Paré arrived and changed the treatment that was being pursued. After a time the Emperor withdrew his forces, in consequence of a clever stratagem by the Duke de Guise; Metz was free, and Paré received a grand testimonial from all quarters. On his return home, the king received him with a loving countenance, gave him five hundred crowns, and told him he would never leave him poor.

One more piece of good fortune after Metz crowned his fame. In 1553 the Spanish emperor, Charles, had threatened to capture the Castle of Hedin. The French, therefore, had the castle strengthened and supplied with eight hundred soldiers and several distinguished officers, to defend the place, with Paré as chief surgeon. The attack came, and Paré's account

of it, extending over many pages of his work, is rich in incident. It is sufficient here to say that the place was taken, and that Paré, now a man of great consequence, gave up all his fine clothes, and entered, in disguise, as a poor attendant on one of the wounded French officers, M. de Martigues. He was permitted by the enemy so to remain until Martigues died, and was then ordered to embalm the dead body that it might still be retained as a hostage. After this, the disguise probably failing, the emperor's chief surgeon took Paré apart, and asked him to serve on his staff. This offer, after many words, in which he was called a fool, he flatly refused, as he also did a later offer to serve under the Lord of Savoy ; for which two offences he would have been sent to the galleys, had not M. de Vaudeville, governor of Gravelin and colonel of foot, prayed for him to cure him of an ulcer of the leg. The task was undertaken, and in fifteen days, the ulcer having healed, the healer was restored to liberty and conducted to Abbeville, whence he proceeded to Amiens, where he found King Henry II., who had already informed Madame Paré of her husband's safety, with promise of his ransom, and who now rewarded that husband with two hundred crowns, choicest royal thanks, and permission to return home after he had furnished the liberal monarch with the full details he had gathered of the strength of the Spanish forces.

In 1557 Paré was at the battle of St. Quintin ; in 1558 at the camp of Amiens ; in 1562 he was at the taking of Rouen and in the camp at Bourges ; in 1563 he was at the Harbor de Grâce, where the English, giving way, retired to England, carrying the plague with them ; in 1564 he was with the boy king, Charles IX., at Bayonne, and remained near him for over two years ; in

1567 he was sent the day after the battle of Dreux to dress the wounded ; and later still, after the battle of Moncontour, he proceeded to Flanders, to attend and treat successfully the Marquess of Auret, brother of the Duke of Ascot.

With this last adventure the military travels of Ambrose Paré were brought to an end. "During twenty years," says one of his enthusiastic biographers, "although there was some respite of hostilities, there was not a campaign that he did not accompany, nor a battle-field to which he did not carry his science, his zeal, and his unalterable humanity."

THE MASTER-SURGEON.

By force of character which had thus overcome all obstacles, Ambrose Paré gradually became so elevated above his original disadvantages, that professional as well as public favour, in due course, waited upon him. His work on gun-shot wounds had become a standard ; the royal will had made him a surgeon beyond dispute ; and, at last, the members of the Corporation of St. Côme, the master-surgeons, came to him of their own free will and accord to ask why he so long delayed to take their degree. Paré objected that he still knew nothing of Latin, and must, therefore, renounce St. Côme. The masters, prepared for the objection, had a ready answer. "Don't trouble on that score, we will get some one who will understand your Latin !" at which Paré smiled as at a joke. "We are serious," was their response. "And I will play no monkey-tricks," was the answer they got in return from the barber-surgeon.

Then they gravely told him that the interests of their great and useful art demanded that he should no longer seem to despise them, nor they him. In so speaking,

they touched him in a vulnerable part, and retired with his promise that he would join their corporation.

With this understanding Ambrose Paré, on August 18th, 1554, asked to be admitted for examination for the bachelor's degree, and on the 23rd of the same month was declared admitted.

On October 8th of the same year he was granted licence to practise; and on December 18th, immediately following, the brethren assembled in great state to hear from him a Latin thesis. "He read his best, which was bad enough;" and then, in accordance with tradition, the President, amidst the acclamations of the corporation, declared him full Member of the College of St. Côme. It was a grand occasion, and the Latin thesis made it a merry one.

THE WORKS OF THE MASTER.

From these studies of the life of Ambrose Paré let us now turn for a page or two to his works and practice. The completed works were published in one large volume, dedicated to Henry III., "the most Christian king of France and Poland," and bore date, Paris, February 8th, 1579. In the dedication the author affirms: "I have so certainly touched the mark at which I aimed, that antiquity may seem to have nothing wherein it may exceed us, besides the glory of invention; nor posterity anything left, but a certain small hope to add some things, since it is easy to add to former inventions."

What a good opinion Ambrose had of himself, let the words testify. The form is not good, but the strength is mighty. A man who could believe in himself to that expressed yet scarcely expressible degree, could, being sane, and in sound health, accomplish everything

that in his career and his day was possible. And this is just what Ambrose Paré did. He had toiled, he informs the king, for fifty years, and had been so prodigal of himself, his watchings, faculties, and means, that he spared neither time, labour, nor cost, whereby he might accomplish and satisfy his own desires for his great work, and the desires of the studious. "For which cause, seeking the praise and profit^s of the French nation, even with the hindrance of his particular estate, he endeavoured to illustrate and increase chirurgery,—hitherto obscure, either by the infelicity of former ages, or the envy of professors,—not only by precepts and rules, but by beautifying it with three hundred graven figures or apt delineations."

The works of Paré are included in one volume, published in French in 1575, eleven years after the death of Vesalius, and produced in English dress by Thomas Johnson in 1634, with a dedication by the translator to Lord Herbert of Cherbury. The works ring from beginning to end with chirurgery. Their author knew of three parts of physick,—"*chirurgery*, which by the use of the hand; *diet*, which by the convenient manner of feeding and ordering the body; and *pharmacy*, that by medicines, attempt to expel diseases and to preserve health." But chirurgery stands first; "it is the most evident amongst all the parts of physick;" it is the most ancient; and, "if the difficulty of learning it be a proof of the excellency of the art, who can doubt that it is the most excellent? seeing that no one ought to be accounted a chirurgeon who has no knowledge of diet and regimen, but both the others can perform their parts without chirurgery." "In antient times there was but one performer and user of all these parts. But the multitude of men

daily increasing, and man's life decreasing, so that it does not seem able to suffice for to learn and exercise all the three, the workmen divided themselves."

Surgery or chirurgery is defined as "a diligent operation of the hands, strengthened by the assistance of diet and pharmacy."

Five things are declared as proper to the duty of a surgeon: (a) To take away that which is superfluous as in amputations; (b) To restore to their places such things as are displaced, as in hernias; (c) To separate those things which are joined together, as in parts rendered adherent by burns; (d) To join parts which are separated, as in stitching up a wound; (e) To supply the defects of nature, as in setting an eye, an ear, a nose, or one or more teeth, or filling up the hollowness of a palate produced by syphilis, with a gold or silver plate.

After the definitions of surgical art, the author proceeds to consider "*things natural*;" the *elements*, which he names as fire, air, earth, water; the *temperaments*, which he divides into the sanguine, choleric, phlegmatic, and melancholic; the *faculties*; the *actions*; and the *animal spirits*. Then he passes to the things "*non-natural*," things *taken, applied, expelled, and to be done*. This is followed by a definition of disease, the nature of symptoms, the indications of cure of disease.

These significant passages are culled from the "first book" of the complete works of Paré, but there are twenty-eight more books in sequence, not one of which ought to be neglected by the surgical scholar, who will find in Johnson's translation, or better still in Malgavne's recent edition, all that he may desire. These books are on anatomy, tumours, wounds, gun-shot wounds, contusions, and gangrenes; ulcers, fistulas, and hæmorrhoids; bandages or ligatures; fractures,

dislocations, divers preternatural affections, usually left to cure by surgery ; the gout, the lues venerea; the plague; the means or manner to repair or supply the defects of man's body ; the generation of man; monsters and prodigies ; the faculties of simple medicines, as also their composition and use ; distillation ; how to make reports, and embalm the dead ; and last, but historically first, a treatise of his divers voyages or travels in his career with the army.

As the leaves of these books are turned over, the temptation is great to comment on the subject-matter presented for study, until it becomes clear that nothing short of a new English edition of the whole would satisfy the reader. I can, therefore, convey no more than an idea or two of the reason why, by his writings, this barber-surgeon of France became a surgeon of lasting celebrity.

There was in his work *rich humanity*. Ambrose Paré had a heart that was greater than his mind, and many things which he did were prompted rather by good feeling and kindness for the suffering, than by foresight or science.

There was in his work *courage* as well as humanity ; the man gentle as a dove was brave as a lion. He feared no physical dangers ; he knew his own mental strength ; and he rested on both without shrinking or care of contradiction. These facts explain as they excuse what has been called his egotism.

There was *pride* in his work ; but it was pride that was justified by results, and it was tempered by the knowledge that he, at his best, did but place the sick in conditions favourable to recovery. He treated, God cured.

There was *skill* in his work, as the numerous surgical instruments which he invented, and many of which remain to this day, abundantly testify, and as the records of his operative proceedings equally proclaim.

There is, lastly, in the work, *solidity*, earnestness in all that is written, combined with an unceasing care and watchfulness, which alone were sufficient to stamp the man as a man "*sui generis*," whom the princes, nobles, and peoples singled out because of merits which would not be despised, and which could neither be ignored nor forgotten.

Too little has been made of these grand qualities in Ambrose Paré, too much has been made of his originality. It is true that in his treatment of wounds he cast aside the awful practice of pouring in boiling oil, and in place of that barbarous practice employed an antiseptic dressing of terebinth and oil of roses, digested with albumen. But in this change he merely reverted to a practice which even in his time was as old as the hills,—perhaps older than a great many,—a practice which we know, by modern return to it, has striking advantages. Again, it is true that in arresting hæmorrhage from bleeding arteries he threw aside the cautery for the ligature, for which it is said his enemies derided him as one who "let life hang on a thread." It was a courageous act, at first most courageously done on the temporal artery of a merchant and in the presence of three sworn surgeons, who dared not use the cautery at that part of the body. But the operation of ligature was not a new operation; it was an old operation by a new, resolute, and skilful hand. It was, however, so good an operation that it took the place of the actual cautery for many ages too determinately, since it put

a ban on what we now know is, in many instances, a far better remedy than the ligature.

THE CLOSE OF THE STRIFE.

We draw near the end. The chirurgion of four French kings, Henry II., Francis II., Charles IX., and Henry III., returned to Paris to rest after many troubles. A story raised against him that he had some hand in the death of Francis II. we may put aside as mere venomous scandal, disproved by the confidence and affection of the successor of that unfortunate and short-lived prince. Yet all was not yet untroubled sea for our man of many "voyages."

On August 24th, 1572, was the terrible massacre of St. Bartholomew, in which Ambrose Paré was one of the Protestant proscribed. The King, Charles IX., who, with his mother, the infamous Catherine de Medicis, was the head and front of the barbarity, had no mercy, save for one man whose services he dare not lose. *Tuez ! tuez !* was the cry of the king, but spare Ambrose Paré. And Paré was concealed and spared,—spared in the face of all the fabulous stories about his conduct then and there. Spared, retaining the reformed faith in which he had been born and bred.

He was spared also to watch and tend the miserable man, his royal master, through all the months of agony and remorse during which that crowned sufferer threaded his way to the death that gave to him the only passage to peace.

Finally, he, Ambrose Paré, barber-surgeon of Laval, was spared to be raised by the successor of Charles IX., Henry III. of France, to the dignity of a Counsellor of State, as well as Surgeon-in-Chief ; and, so honoured, he chose for his last residence a noble mansion in the

Quartier St. Andrew des Arcs, where he could gather together learned with congenial and admiring friends, beautiful works of nature and art, to his unceasing satisfaction and pleasure. The poet Ronsard wrote lines to him, and tried to render homage by giving the province of Vendôme the honour of his birthplace. The Faculty of Physicians did him the distinction of finding out that he, a surgeon, had written a treatise on fever, and got the local authorities to order the book to be publicly burned, but the order failed. It then got the Parliament to allow them to use the scissors freely on the wicked book, and, that again failing, it gave him the golden revenge of seeing his whole book pass through threatened fire and steel without a line of injury. And so on until December 22nd, 1590, when, surrounded by all he loved best, he slept the sleep of sleeps, at threescore years and ten and three.

If in those supreme moments the events of the life of Ambrose Paré passed in review before him, as some suppose possible, what a picture was presented to him! Nothing belonging to the sons of medicine would probably come near to it. He might have seen himself as a groom, a gardener, a village barber's apprentice; a barber wandering from town to town; a barber-surgeon in the army, mixing in great battles, running deadly perils, assuming disguises, inventing new methods of surgery, re-introducing old methods. He might have seen himself as a barber-surgeon in Paris, now despised and persecuted by the Faculty of Surgeons, and anon solicited by his persecutors to honour them by joining their fraternity. He might have recalled himself as a surgeon to four of the worst kings of France and a queen—wife and mother—as bad as they. He might have summoned up the shades of such cotemporaries as

Rabelais, L'Hôpital the Chancellor, for whom the word *politician* was first coined,—and numbers of princes, warriors, nobles, statesmen, who made the history of his time. He might have remembered the origin of the word Huguenot, and shuddered once again at the horrors of that awful massacre which he almost alone of the cheated and doomed citizens survived. He might have closed his dying dream of so wonderful a career by recognising himself as the author of a book which, escaping both fire and steel, was destined to live on, even as he hoped to live, in new and ever-changing spheres of life and honour, to the glory of France and his own immortal fame.



OPUSCULA PRACTICA.

“There are mites in science as well as in charity.”

BENJAMIN RUSH.

THE SPHYGMOPHONE AND PULSE STETHOSCOPE.



WHILE experimenting with Hughes' electric balance in 1879, it occurred to me that I might get a secondary or telephonic sound from the movements of the pulse at the wrist. I effected this in a very simple manner, by adding a microphone to a Pond's sphygmograph. I mounted on a slip of ebonite a plate of gas carbon. I placed the slip in the sphygmograph as if about to take a tracing of the pulse. I connected one terminal from a Leclanché's cell to the carbon, and the second terminal from the cell to a terminal of the telephone. Then I connected the other terminal of the telephone with the metal rod of the sphygmograph. The instrument was now ready for use. It was placed on the pulse, in the ordinary way, and adjusted, with the writing needle thrown back, until a good pulsating movement of the needle was secured. When the movement was in full action, the needle was thrown over to touch the carbon plate, which it traversed with each pulse movement, and so completed the connection

between the telephone and the battery. The needle, in passing over the carbon plate, caused a distinct series of loud sounds, from the telephone, which corresponded with the movements of the pulse. When all was neatly adjusted, the sounds heard were three in number, one long sound and two short, corresponding to the systolic push, the arterial recoil, and the valvular check. The sounds gave a singular imitation of the two words, "Bother it." They were made very loud by increasing the battery power. I named the instrument the sphygmophone.

The above description of the invention of the sphygmophone was communicated to the Royal Society on May 14th, 1879, and was published in the Proceedings of the Society, No. 196, for 1879. Since then I have had the instrument in frequent use. It is not so good a recorder as the sphygmograph, but it is useful, in class, for demonstrating the pulse movements to several persons at one time; and, by practice in working it, it becomes, sometimes, diagnostic. Thus, in anæmia the ordinary sounds are replaced or covered by a peculiar soft whirring sound like a wheel in rotation. Lately, I have simplified the sphygmophone for daily clinical use by doing away with the battery and telephone, and letting the needle of the sphygmograph play over a thin layer of resonant substance attached by a short length of india-rubber tubing to a small ear-piece which fits into the ear. The sounds elicited are quite as distinct as the sounds of the heart heard through a stethoscope, and the instrument producing them may be considered as a pulse stethoscope, very useful at the bedside, where a carbon paper for taking a tracing is not at hand.

CARDIAC SOUNDS IN WORDS.

HEN the stethoscope first came into use, observers of the morbid sounds heard by it were accustomed to compare the sounds to words or other noises with which the ear had been long familiar. Sometimes, too, when they were very much startled by a loud sound, they named it by some strong imaginary expression such as *bruit de Diable*. Such imaginative terms have gone out of use, but the expression of imitation of words and other well-known sounds is still sometimes retained, and with service. To this vocabulary, if I may so designate it, I would add a striking expression in words which is always heard in one class of cases of mitral-aortic disease. The words, so regularly repeated as to be unmistakable, which are heard most distinctly at the base of the heart, and towards the left side, are "*Who's a-coming?*" There is no obscurity about the words, and when once they have been pronounced they are always to be detected afterwards until the death of the person from whom they proceed. They indicate a confirmed and serious stage of cardiac disease: rigidity of one curtain of the mitral valve, and rigidity, with contraction, of the aortic semilunar valves. The sounds are produced by a double regurgitation: a regurgitation from the ventricle back into the auricle, and from the aorta back into the ventricle. The rigidity is permanent, and the resultant phenomena of sounds are, therefore, permanent also, and positively diagnostic, when they are clearly pronounced. I have heard the sounds in patients of both sexes, but never in a subject under twenty.

SOLUTION FOR FIXING SPHYGMOGRAMS.

F the various spirit solutions or varnishes which I have used for fixing sphygmographic tracings, I prefer, on the whole, the simple spirit solution of gum benzoin. The solution is very easily made ready for use. Into a six ounce, anatomical wide-mouth bottle, with a firm base, put a quarter of an ounce or more of crushed gum benzoin. On the gum pour as much absolute alcohol as will fill the bottle, and leave the benzoin to dissolve. So soon as the alcohol refuses to take up any more of the gum the solution is ready. The carbon paper bearing the tracing is dipped into the solution for a moment, removed, allowed to dry, and after it is quite dry is laid flat on the table and rubbed briskly with the thumb or with an ivory paper knife, until it is polished up like a piece of bright ribbon. It will then remain in good condition for any length of time. When, after frequent use, the solution in the bottle gets low, it is only necessary to add a little more spirit in order to take up a further charge of the gum which remains undissolved at the bottom. A bottle of solution made last May, in this way, has been amply sufficient for my work, although the work has been going on several times a day ever since.

It sometimes happens that a deposit of carbon takes place in the fixing-solution. When this occurs spirit containing water has been used, and as the solution so produced leaves a tracing which is not effectually fixed and is easily smeared, it is best to make a new quantity with purer alcohol.



METHYL-ETHYL ETHER.

IN 1849, Professor Williamson discovered an ether to which he gave the name of *Methyl-ethyl Ether*. It is a definite chemical compound composed of C_3H_8O , and it is made from methyrate of sodium by treating that methyrate with iodide of ethyl. In the decomposition which ensues iodide of sodium is produced with the *Methyl-ethyl Ether*; the ether is distilled over into a reservoir surrounded by crushed ice or iced water.

Methyl-ethyl Ether is a fluid boiling at 52° Fahr., and having a vapour density of 25° , taking hydrogen as unity. It is more soluble in water than sulphuric ether, water at a temperature of 40° Fahr. taking up one fourth of its own volume.

In turning over some notes of experiments which I conducted in 1866-7, I found amongst several other unpublished and forgotten records the subjoined, relating to methyl-ethyl ether.

Methyl-ethyl ether is very pleasant to breathe as a vapour, and the aqueous solution of it forms one of the most agreeable ethereal solutions of all the ether series. It could easily be used from an iron bottle in which it has been compressed by cold.

Two fluid drachms of the ether, diffused at 50° Fahr. in 1,000 cubic inches of air, produce a narcotic atmosphere, but the vapour may be inhaled with air with comparative ease and safety, without any dilution; indeed, in order to make it take rapid effect, it cannot be pushed too rapidly. The peculiarities of its action are that it tends to induce a condition resembling

asphyxia, leading to a prolonged sleep. A pigeon, narcotised with the gas, remained, without further administration, insensible in common air, at 60° Fahr., for five minutes. Rabbits were equally influenced. In the human subject the inhalation required to be prolonged for a period of three minutes before a decided influence was induced; then the effect continued for from four to five minutes, with sudden awakening, in the same way as from the sleep induced by methylic ether. Like all the ethers, methyl-ethyl ether causes paralysis of the pulmonary vessels; the danger from which is, however, not immediate, for the heart remains in good action when respiration has actually stopped under the inhalation of the vapour. Thus, after three minutes' cessation of respiration, there was good recovery, while artificial respiration sufficed within that period to restore, immediately, the independent life.

Altogether this ether is so safe and pleasant in effect, and so effective in action, that it might be brought into extended use. It occasionally causes vomiting, but not of a severe character, and the asphyxia it induces is more alarming in appearance than in fact. The veins of the neck fill and pulsate with the movements of breathing, but the danger is slight, if any, until after an administration so prolonged as to lead to exudation of fluid into the bronchial passages and to arrest of the circulation through the pulmonary circuit.

REVISION IN MEDICINE: AN OCTOBER STUDY.

S each October comes the student-life revives. What is the profession like, and what is it to be? The people not belonging to it, rich and poor, learned and unlearned, clergy, judges, scholars, artists, nobles, commoners, men and women of all classes, continue to treat the profession as a mystery, and believe in it rather as being a mystery than a science founded on the rock of science, common-sense. We who are still students of medicine of every period of life ask ourselves,—if we be students in deed as well as in word,—what are our advances, whither are we tending, what reforms are urgent, what new light is near? In this reverie a few subjects press themselves specially forward bearing on revision and on progress.

REVISION IN LANGUAGE.

To begin with simple things, the first revision required is, the simplification of the language in which we professionally communicate with ourselves and with the world. We complain often that the world is ignorant because it does not comprehend our learned speech. The wonder truly is how the world tolerates us at all in this respect, or gives us patient hearing; and there is a greater wonder still: how we ourselves manage to master the terms we use so glibly. Certainly we are

forced to devote more brain-work to the acquisition of mere useless terms than to all the practical facts we know and can put together. We turn to our nosologies, and find there are five hundreds of terms, each several ways modified, for less than half their number of diseases, and, what is worse, we consider it wholesome to continue adding to the list ; the primary false step being this : that we lift up phenomena, or symptoms of disease, into essences of disease, and having theorised that the phenomena mean distinct maladies, try to invent as many causes as there are phenomena, taking up the causes as so many secondary considerations. We turn to our physiology to discover the same error ; phenomena classified in hideous mysticism of expression, with increasing mysticism day by day ; negatives turned into affirmatives, and the reverse, to suit the pleasure of the mystifier. We turn to anatomy, and if we be of free mind, we conceive that in the description of the mechanical parts of an organism, whether it be animate or inanimate, there should be no difficulty. Puerile delusion ! The language of descriptive anatomy is systematically barbarous ; one structure or part is named after a man, another after a part of a man ; another after a beast, another after a fruit ; another after a function, another after a shape ; another after a quality ; another after some objective thing, a boat, a stirrup, a lyre, a bridge, a pen, a hammer, an anvil, a road, an aqueduct, a canal, a drum, a bed, a sieve, a saddle, a ditch, a hole, a mountain, a vestibule, a labyrinth, a staircase, a mitre, a sheath, and so on. We stagger under the weight of such useless remembrances, in which there is no method, and as a rule no correctness, even in simile. We turn to pathology, by comparison a modern study, to find, alas ! no better language. And at last

we turn to chemistry, as the most fixed of our studies, and except that there is some method in its madness, the madness of the language of chemistry is the maddest of all.

It seems, as the wearied mind recalls how much we have been forced uselessly to learn and relearn and unlearn, that we want a complete revision of nomenclature in every department, and that any man, or any society of men, or any council of many societies, that should set itself to work, in ever so small a way, to bring into use a simple and reasonable scientific medical language, would do the most important service that ever fell to the lot of man to perform. A manual of anatomy compiled on reformation of language would be the best beginning, and would soon lead to continuance of reform in physiology, nosology, chemistry, and all the other branches of physic.

REVISION IN OBSERVATION.

It is essential that we should revise method of observation not less than method of expression of observation. It is not that we need new inventions of research, but that we require to exchange some favourite methods, well nigh worn out—and, honestly speaking, not very useful, except as floating capital—for some other methods not worn out, and asking to be turned into capital promptly. Let us take up one or two points in illustration.

The immensity of the discovery of the circulation of the blood so deeply influenced medical men, that, for over two centuries, all dynamical acts of the living body have been included in the study of the circulation, while, to create newness, many ideas have been connected with the discovery year by year, some of which

are good, others, at the most, a mere part of the thing itself, or perhaps no part of it, but an imagining upon it. The blood flows from the heart by an artery into the body, the blood flows through capillaries into a vein, the blood flows back by a vein to the heart; the blood is red, the blood is dark; the blood is vitalising, the blood is poisonous; the blood takes up heat, the blood gives up heat; the blood absorbs gases, the blood gives off gases; the blood is liquid flesh, the flesh is solid blood; the blood bleeds, the blood stops bleeding; the blood is a fluid, the blood is a solidifying liquid; the blood turns all animal parts into itself, the blood yields all animal parts out of itself; there is a healthy body, the blood therefore is healthy; there is a diseased body, the blood therefore is diseased.

There is in these forms of thought much simple truth, much error, much want of true appreciation; so that, here also, an instauration is demanded, founded on new physical truths. The idea that arterial blood is a sustainer of life, and venous blood a destroyer, is an utter misconception, inasmuch as modern research tells us, not only that arterial blood is a sustainer up to a given point, and no further, but that arterial blood could not be produced unless venous blood were present to play its part in the process of supporting life. The idea that the elaborate system of blood-vessels is laid down for the simple purpose of circulation is an error, or at least a shortcoming of truth. A river may be the mechanical means for bringing into a town on its banks all the necessities of the town—the water, the food, the fuel, the clothing; the same river may be the means of removing all the used-up materials and débris from the town; and, by comparison with the two streams of the blood, it may be said to complete a circulation.

But the problem of the service performed by the river is little enough after its circuit is discovered, until we know what takes place in the town, with the things brought into it, utilised, and sent out of it. The same in the body; it is poor work to know the circuit of the blood and not to know all that takes place out of the circuit, the transitions of substance in the provinces of the body through which the river flows. It is the fact, nevertheless, that up to this time we have made out little that is positive on this grand point. Happily, method of new research is suggested to us in various ways, and in such ways that the research can be conducted accurately, even out of the body.

The influence of the old humoral pathology hanging still about us, we are bound by its strong bonds to the blood as the fountain, not only of all health, but of all disease. We talk of blood diseases as if we knew every fact about blood disease with a certainty of absolute knowledge. Candidly, however, what do we know about blood disease? We know of white cell blood; we know of chylous blood; we know of anæmic blood; we know of a blood with a deficiency of fibrine; we know of a blood with an excess of fibrine; we know of a blood modified by bilious matter; and, in some extreme forms of fever in a late stage, we know of a condition of extreme fluidity with disintegration of corpuscle of blood. All this is valuable knowledge. But what know we about direct morbid influences upon blood? We talk of zymosis, and speak of some diseases, which are assumed to be due to poisoning of the blood, as zymotic blood diseases; but respecting this zymosis or fermentation of blood as a fact, we have not a touch of direct evidence.

There may be fermentation in the blood, but if so, we do not yet know what parts undergo the change, and we understand nothing whatever of the products of the fermentation, what they are, or where they go to. We say, in reference to poisons, that they enter the blood, and are conveyed by it to all parts of the body, so that the blood is the channel by and through which all poisons act. Is this true? It is not proved true; and modern evidence respecting the action of nitrite of amyl and hydrocyanic acid is to the direct proof that the blood channel may be unnecessary; that immediate action on a nervous expanse, the olfactory for example, may be an efficient influence; and that blood-changes and changes of circulation, though the first visible phenomena, may be but secondary phenomena to the nervous impression. We see even that the organic nervous system itself may be immediately influenced through the senses, and that as one agent—a particle of musk, for instance—can produce one distinct effect, an odour, so another agent—such as a volatile organic nitrite—can, through the same medium, produce another distinct effect. What then of the agents that cause our spreading diseases, in which the alarm is first rung on the sympathetic nervous chain, in symptoms of nausea, vomiting, irregular tension of blood-vessel, and other proofs of disturbed balance of power in the organic centres? In what do the crimson blush and injected throat of scarlet fever differ from the crimson blush excited by nitrite of amyl? May it not be that in scarlet fever the sympathetic is paralysed, and that the vessels it controls are no longer under steady rein; and may not the nervous derangements be primary, the blood derangements secondary? These questions answered, and the class of acute pestilential diseases, which now sweep

away our populations at the season of life when all is promise and hope, may become the easiest of cure.

The same hope may also extend to chronic diseases. We say cancer is a blood disease. Is it? There is no evidence of such thing; but there is much evidence that it is, primarily, a nervous disease. We say of all hereditary diseases that they are blood diseases. Are they? There is no evidence that they are; but there is most telling evidence that hereditary proclivities of all kinds, mental and physical, have their origin in the nervous system. The researches of Dr. Brown-Séquard on the transmission of epilepsy from generation of animal to generation through a primary injury of nervous matter, call out to us to revise our course of thought altogether on blood heredity.

REVISION IN CURE.

Up to this time we have been divided into three camps of so-called curers. There have been men so saturated of faith as to hold up the Elixir Vitæ, and maintain the discovery of the art of extending life to indefinite length. There have been those who, watching the uncertainties of cure, and perfectly innocent of faith of any kind, have laughed secretly at all attempts at cure, and have carried a banner white as their own vitals. There has been and is a camp which has continued to toil away, amid all difficulties, conscious of the extreme follies of their divided allies, conscious of the limitations of their own power, and yet not sorrowful like men without hope, but doing the best, and believing in the grandeur and ultimate success of our calling. With this last camp the future of physic, in its curative and practical life, must remain for perfect development. The ideal of a perpetual life on

a limited planetary surface, with an unlimited reproduction of life, is a physical absurdity, suggesting opposition, not to death alone, but to birth, and suggesting the re-editing of every human work except humanity. The ideal, on the other hand, of humanity charged and filled with soul, and advancing ever towards the high, the higher, the highest intelligence—the ideal of this humanity panting out its life in eternal sufferings and repulsive deaths, without helping itself to the euthanasia that has been so beneficently provided for it at the close of its natural cycle, is equally absurd physically while it is infamous morally. They, therefore, who have fixedly before them the labour of cure, have this for the grand scope of their task, that between the first natural appearance of the human living thing on this earth and its last natural appearance, it shall not die from unnatural causes, nor from natural causes that come within the governance of man. They are led, not simply to the prevention of injuries of the body, but to the remedying of injuries they cannot prevent. And what is their prospect? It is good. Their prospect is good, because they are learning definitely, not to lose trust in remedies for the reason that they cannot apply them at once with accurate judgment, but to believe in them as powerful means of cure that are yet to be accurately employed. Their prospect is good, because they are no longer picking up remedies upon remedies without object, trying them in any and every disease, and saying, “We have tried this or that agent, and have found this or that result,” but are now seizing certain agents, and are forcing them to tell what they can perform on the body, what is their physiological action, and what antagonism of action they offer to the phenomena of disease. Their pro-

spect is good, because they are learning in respect to remedies, that the physical action, limited as it is to action on oxidation, action on the process of animal natural dialysis, or action in controlling or exciting the nervous systems, may be learned by methods of physical research, that wait but to be tried to be proved as truthfully to them as to other physical inquirers.

From all these points of view the prospect is, that our conquests in the direction of cure will be as rapid and certain henceforward, as they have heretofore been slow and uncertain; that we shall gather insight as to what can and cannot be done for cure; and that when we say a cure can be effected, we shall carry out what we say with the confidence of men who have the cure in their hands, and the knowledge to use it.

REVISION IN OBJECT.

As we advance in the directions I have tried to signalise, we shall stand firmer and fairer with the world. But our success shall not be perfect until yet another, and the mightiest of all truths breaks upon us, namely, that the solemn and august secret of our power lies not in the amassment, by our professional exertions, of wealth, nor of popularity, nor of that future fame and name in history which all men of noble instinct and noble nature would die to secure, but in the accomplishment of one simple end, *the happiness of mankind*. In this accomplishment our own happiness rests, and with it all true and worthy power, all true and lasting glory. Meted out ever for this end, we require no other incentive for research, no other corrective of research, and no other protective against schismatic foes; nay, we require not even reward of gratitude, grateful though that may be when, spontaneously, it flows at our feet.

It is a simple formula of living action, this, but how potent ! Is this professional desire, is this act, is this practice which we daily do, in desire, in act, in practice, is it for the happiness of the individual, of the race ? Shall the conscientious answer be Yes ? Then is the act strong, unassailable, and, though it even partake of error, blessed. Shall the answer be No ? Then is the act weak, easily controverted, bad. This is not moral axiom ; it is scientific truth. To many in all time it has been known, and medicine has lived upon the knowledge : to many it is known now, and medicine is sustained by the knowledge. But in the future *all* must know it ; it must be the perennial force hidden in our hearts ; our unspoken secret, worthless were it noisily revealed. It must be the bond between ourselves, holding us as brethren in such subtle sympathy, that envy shall be an instantly detected deformity, repulsive and retreating. It must be the bond between ourselves and the world, by which the world shall hold to us neither from wonder, nor admiration, nor other doubtful quality of recognition, but from confiding, habitual, abiding trust in our absolute precision and measurable skill.

EXPERIMENTS TOWARDS THE ANIMAL
BATTERY BY COMPOUND SYNTHESIS
AND MICRO-ELECTROSCOPY.

PART IV.

TRANSMUTATIONS OF BLOOD UNDER ELECTRICAL
VIBRATION.

IN the first of this series of papers, ASCLEPIAD, No. ix., pp. 74-87, reference was made to experiments in which blood subjected to electrical discharge or to the electrical current was observed under the microscope, — electromicroscopy. It may be well to close the series of the present volume by supplying a brief abstract of this part of the research.

The mode of research was reduced intentionally to as elementary and uniform a method as could be pursued. The magnifying power used was from three hundred and fifty to four hundred diameters; the source of blood was always the same, a drop of mixed blood—capillary—drawn by a needle puncture from my own hand; and, as far as possible, the times and conditions of observation were regularly maintained. The blood while quite fresh was in each case received from the bleeding point directly upon the microscope slide. It was then covered with the thin slide and transferred to the stage of the instrument after or during the time of subjection to the electrical discharges. At the same time, another slide, receiving blood in the same manner, was put aside in order that

the changes which it underwent spontaneously might be read, in comparison, from stage to stage, during the course of observation.

The blood was submitted to the electrical vibration either from the direct shock of the statical machine—Wimshurst's—or to the shock from a secondary or induction coil. The shock was directed, in some instances, through the blood as if it were a part of the circuit, by making two small platinum points, connected with the electrodes, dip into the spot of blood at opposite margins on each side. In other cases one platinum point passed from the blood to one electrode, while the spark from the opposite electrode was received on the thin glass plate which covered the blood. The greater number of observations were made under the influence of an inch spark, measured by Lane's electrometer; but this was very much varied in the attempt to gain uniform results from some one particular discharge, the importance of which attempt will appear in the sequel.

If the vibration from the discharges of the machine were commenced before the blood had coagulated, and before the corpuscles had ceased to float, the movement of them was invariably seen to be sustained long after the corpuscles put aside for comparison were entirely quiescent. In some instances the movement continued for a period of over two hours, in one instance for two hours and forty minutes. The distribution was also different from what took place in the blood left to itself. There was never any aggregation of corpuscles in rolls with the rolls lying about in distinct clusters as in the ordinary way. The corpuscles often adhered together by their flat surfaces; but as often they joined at their edges, and seemed to change in form and to coalesce, as

if their flat surfaces had originally come into contact. The most curious, and at the same time the most common, movement consisted of a rapid massing together of a number of corpuscles with intervening canals, which looked exactly like a capillary network. Into these canals, corpuscles that were loose and lying in what may be called lacunæ would enter, and alone, or attached to each other in a line, would course along as we see the corpuscles in a living transparent web course along a capillary channel. In many instances the corpuscles, making their way along a canal, would touch the side of the canal, become adherent, and then disappear, forming part of the wall, but without in the slightest degree reducing the calibre of the canal itself. At the conclusion of an observation when the vibration had been sustained for two hours, the whole field would often be a field of such network of canals, the ordinary structure of the corpuscle entirely lost except at the edges, where a few corpuscles, which had not come under the influence of the vibration, alone remained to indicate that the mass of structure beneath the glass cover had consisted originally of red corpuscular matter.

Some equally curious effects were observable in regard to the colouring part of the blood. It often happened that, under the influence of the vibration, the whole of the colouring substance in a surface of corpuscles would be extruded, and would be found as a separate structureless surface of colour at a distance, *i.e.*, in another part of the field altogether. The corpuscles, thus deprived of their colour stuff, would be colourless, with their edges adherent, and forming a new network of cells, squamous in character, and extremely uniform in shape and outline.

In other instances the red colouring matter would condense, as it seemed, around or within a mass of corpuscles. In such cases the corpuscles would sometimes strike out into a stellate form, the rays rounded and clubbed at their free ends. In these projections or rays, the colouring matter would be quite concentrate, so that the projections would be stained a deep blood-red colour.

It was a common occurrence, when the vibrations from the discharge through the blood had been intense, for the corpuscles to separate in little groups. Under these changes, two corpuscles would come together by their edges and form one ovoid outline, with a line across the centre ; or three would adhere in a similar manner, divided by two lines ; or four, divided by three lines ; or five, by four lines ; and so on. These curious combinations resembled the divisions of cells that have undergone the process of fission, and, occasionally, a number of the divided corpuscles would be surrounded by a marginal line which enclosed them ; but, as a general rule, they adhered together without any surrounding structure, in groups lying at a little distance apart from each other in the same field.

Another form of disruption of corpuscle which frequently occurred consisted of the breakage of a corpuscle into two halves, and in the adhesion of the rounded free edge of the broken half to the same edge of another broken half, or to the edge of a line of solid corpuscular matter. Under these circumstances, the contents of the corpuscle having been set free, the corpuscle assumed a semilunar or crescent form, the pointed ends of the crescent standing out sharply. Sometimes the convex edges of two corpuscles, so changed, would adhere, back to back, producing a double-pointed

figure like an old-fashioned letter *x*. Sometimes a row of these broken corpuscles would adhere by their convex edges to a line of solid substance, when their spicular crescentric endings would stand out in fine needle-shaped projections, like cilia, but quite motionless.

In many instances cyst-like cavities were formed of very distinctive and remarkable character, varying, to common appearance, from an eighth to a fourth of an inch in diameter. The cysts were sometimes perfectly circular, but as often ovoid in shape. They always presented a clear inner line, or wall, like a basement wall, which was quite distinct from the structure in which they were embedded. The cysts occasionally were void or empty, but most frequently they contained structural forms, loosely spread about, and in all instances crystalline in character. The crystals varied in different specimens. One set so closely resembled uric acid crystals as to be at first mistaken for them; these were tinged with red colour, as a rule, and two or three of them would hang together, as if broken where they adhered. A set of crystals of an entirely different order would quite fill another space; these crystals were of waxy whiteness, like cholesterine, but acicular in shape. In some of the cysts in which these crystals, of either kind, were found, the corpuscles were edged round the inner surface of the cyst in the spicular form described above, the convex margin of the corpuscle adhering to the inner surface of the cyst, the pointed ends directed into the cavity, and forming a wall of minute points. If the mode of transformation of corpuscle had not been seen in progress, it could, I am sure, never have been divined how this singular arrangement had been brought about.

I have said that the corpuscles were now and then found spread out in a squamous form. This was attended in many examples by such softening away of the outlines of the corpuscles as to give the idea of a membranous surface through which tubular lines, sometimes bulbed at one extremity, and at other times interlacing like a plexus of nerves, were detected. These lines were all semi-transparent; measured by the eye, and compared with lines which were not magnified, but drawn on paper, they seemed one-fifth of an inch in diameter. They had an inner and an outer outline, as if an inner tube had been formed within one of those canals which were described, in the earlier part of this essay, as forming a vascular network.

Between the appearances now related as induced in blood by the vibrating shock and those occurring in blood left at rest there was no comparison. The blood left at rest assumed at once a definite form, which it retained for some days, and then passed into a series of decompositions, themselves of deep interest, and well worthy of a separate record, but different in respect both to time of change and quality of modification.

A comparison was instituted between the modifications of blood under the vibrating discharge and the modifications induced by passing voltaic currents of varying intensities through blood on the microscope slide. The comparison was not close. In the decomposition from the voltaic current the fibrine separated at the positive terminal, and from the point where hydrogen was evolved globular spaces, like the cysts above-named, were produced. But the phenomena generally partook of destruction rather than reconstruction, while the phenomena from vibrating shock partook of reconstruction altogether and of the development of new

and permanent structures. If, indeed,—and it must be admitted that in this case the “if” is a very big word,—it had been possible to produce *at will* from the vibrating influence the structural peculiarities that have been named, always on the same patterns, and in obedience to fixed rules of procedure, it might be advanced that the art of constructing out of blood the different tissues of the body in their devitalised state had now been discovered. But as in the whole of twelve months of observation, almost from day to day, I have never been able by any repetition to forecast correctly what would be the precise result from any one experiment, there is too much uncertainty to allow of the phenomena being as yet accepted as out of the range of accidental demonstration. All that admits of being said is, that while the order of demonstration is most uncertain, the products are limited, and when developed are exceedingly uniform. This certainly suggests that the failure in regard to order of development has depended so far on shortcomings of my own—most easily admissible at this stage,—in details of repetition, shortcomings which time for longer and more varied observation may rectify.

If, again,—and once more the “if” is a very big word,—if it should turn out true that by the vibrating influence blood may be transformed into tissues, then we must modify our views altogether as to tissue-forming material, in order to accept the inevitable fact that all tissues are constructed out of the red corpuscles, not the white. In my observations the white corpuscles played no part whatever; every transformation, singular as it might be, came from red corpuscles; and the very circumstance that the red corpuscles can be so curiously transformed is of itself sufficient to constitute the be-

ginning of a new chapter in minute anatomy and histology.

The forces at work in the production of the changes specified are, as I at present, and subject to correction, think: (*a*) Vibration between the retaining glass surfaces and the retained blood; (*b*) Slow decomposition of water, by which oxidation is permitted, and by which, under liberation of free hydrogen, the canals and cysts and other structural forms are, to speak familiarly, blown into form out of the colloidal material, as in the art of blowing glass, or soap, or albumen into different forms by air or the breath; (*c*) Crystallisation of crystallisable matter that has been separated from colloidal.

The best results are obtained when the blood is brought most quickly under the vibration, that is to say, at a time when it is still fluid, and when its corpuscles are in free and active movement.

It is worthy of note in bringing the first chapter of these new observations to a close, that when I was experimenting, many years ago, with the great induction coil of the Royal Polytechnic Institution, I observed in animals that had been killed instantaneously by the electrical shock some phenomena similar to those above described. The separation of colouring matter from the blood, and the staining of tissues by it, was often very definite in parts through which the discharge had passed. The presence of crystalline matter in the blood was also a rather common result of the vibration.

COTEMPORARY PRACTICE AND LITERATURE.

"Every physician will and ought to make observations from his own experience ; but he will be able to make a better judgment and juster observations by comparing what he reads and what he sees together."—FRIEND.

TWO SIDES TO THE MICROBE.

(PROFESSOR DE CHAUMONT, M.D., F.R.S.)

HEN we hear it said of a community that there are in it "good and bad of all sorts ;" or when we hear it said of a calamity that "there is nothing so bad but it might have been worse," we know what it all means. We are listening to an apology for somebody or something in which the apologist only half believes, and which he is letting down as easily as he possibly can. In such a tone our distinguished and ingenious friend Professor De Chaumont let down the immortal microbe at the York Sanitary Congress. It was not a very weighty body which he had to let down, and, indeed, his skilful art was most troubled in making such an infinitesimal weight find any bottom anywhere, it wafted so easily with every wind of doctrine ; but some way he did it, and it was a happy doing. Once let it be believed that De Chaumont is right, and that microbes are useful as well as dangerous, are to be courted as well as avoided, and the pestis baccillorum will soon cease to afflict this miserable world. That microbes should

be scavengers like mushroom spawn, and out of the womb of death produce useful forms of life, is an excellent idea, but one that will not be so popular as the assignment to them of the rôle of great conquerors, devastators, and wholesale destroyers of the human and all other families. This is no more likely than that the learned Professor, whose labours as a life-saving soldier are superb, should ever gain the fame and popularity of a great life-destroying soldier. But, taking it all in all, the suggested change of thought is hopeful, and we may now perhaps soon return to the pastures of scientific medicine, and proceed on our old and sound ways, without the interference of the amateurs of medical science and medical art, who have so long, like so many Delilahs, waylaid and overcome our strongest men.

MASSAGE.

(BY WILLIAM MURRELL, M.D., F.R.C.P.)

MASSAGE is a new term in medicine, which Dr. Murrell defines as meaning "a scientific mode of treating certain forms of disease by systematic manipulation." The word is derived either from the Greek *μάσσειν*, to rub, or from the Arabic word *mass*, to press softly. It is not a new mode of treatment, and it is not a mode which can be learned practically in less than two years. It requires a skilled *masseur* for men patients, and a *masseuse* for women and children.

The ignorant rubber thinks that massage will cure everything. Dr. Murrell corrects this fallacy. He says that as a matter of fact the sphere of its action is very limited. We are indebted, the author informs us, to

the careful and painstaking observations of Professor von Mosengeil for the first accurate and scientific knowledge of the subject." He then describes the method under the different terms applied to it: "*effleurage*, a stroking movement 'made with the palm of the hand passing with various degrees of force over the surface centripetally;' *pétrissage*, which consists in picking up a portion of a muscle, or other tissue, with both hands or the fingers of one hand, and subjecting it to fair pressure, rolling it, at the same time, between the fingers and the subjacent tissues; *friction*, performed with the tips of the fingers; and *tapotement*, a kind of percussion made with the tips of the fingers."

Of the *mòdus curandi* by massage, Dr. Murrell speaks with caution, but suggests, after Mosengeil, that it promotes absorption by the lymphatics. It also increases the circulation through the part and the electrical contractility of muscular tissue. In a series of succeeding chapters which follow the description of the method, Dr. Murrell treats of massage as applied to paralysis of different kinds, constipation, dyspepsia, corpulency, rheumatism, lumbago, obscure pains, neurasthenia, spinal irritation, organic diseases such as syphilis, joint-affections, and rickets, chloral poisoning, and some uterine complaints. In this task he has skilfully avoided saying too much, and he should be read carefully, if for no better aim than to learn how to answer the public on the subject upon which he treats. But beyond that he lays a foundation of practical truth, useful, when right-mindedly used, for the cure of some obstinate and troublesome forms of disease.

THE COLLOQUIAL FACULTY OF LANGUAGES AND THE
NATURE OF GENIUS.

(BY WALTER HAYLE WALSH, M.D.)

THE second edition of this work (London: J. & A. Churchill, 1886) is proof of the appreciation in which it is held by those scholars who live in choicest realms of literature and thought. It is a charming book, the product of one of the most retiring and one of the most learned, original, and independent physicians of this or of any other century. The part of the book which will absorb medical readers most is that which treats on the nature of genius. Walshe defines genius as "*the spontaneously active intellectual attribute, which supersedes the necessity for labour;*" a definition which, once widely known, would become proverbial. It covers the whole ground; and, although its author does, sometimes, apply the term, genius, to men whose right to come under his own definition might fairly be challenged, it is a most happy definition, for which we should all be grateful. The direct heredity of genius the author, very properly, disputes, while he gives a new reading to genius as depending upon the chemical constitution of the great nervous centres. *Sed, lege totum si vis scire totum.*

October
25th,



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